s:fi
RESEARCH

Swiss Finance Institute Research Paper Series N°19-38

The Effect of Unconventional Monetary Policy on Cross-Border Bank Loans: Evidence from an Emerging Market

Koray Alper
European Investment Bank

Fatih Altunok
University of Zurich

Tanju Çapacıoğlu
Central Bank of Turkey

Steven Ongena
University of Zurich, Swiss Finance Institute, KU Leuven, and CEPR

The Effect of Unconventional Monetary Policy on Cross-Border Bank Loans: Evidence from an Emerging Market

Koray Alper	Fatih Altunok	Tanju Çapacıoğlu	Steven Ongena *
European Investment Bank	University of Zurich	Central Bank of Turkey	University of Zurich Swiss Finance Institute, KU Leuven and CEPR

This draft: July 17, 2019

We analyze the impact of quantitative easing by the Federal Reserve, European Central Bank and Bank of England on cross-border credit flows. Relying on comprehensive loan-level data, we find that Fed QE strongly boosts cross-border credit granted to Turkish banks by banks located in the US, Euro Area and UK, while ECB and BoE QEs work only moderately through banks in the EA and UK, respectively. In general QE works at short maturities across bank locations and loan currencies, more strongly for weaker lenders and borrowers, and may have resulted in maturity mismatches in Turkish banks searching for yield. (99 words)

***Keywords*:** bank lending channel; bank borrowing channel; monetary transmission; quantitative easing (QE); cross-border bank loans, micro-level data, capital requirements, financial de-globalization

***JEL classification*:** E44; E52; F42; G15; G21

*Corresponding author: steven.ongena@bf.uzh.ch.

Ongena acknowledges financial support from *ERC ADG 2016 - GA 740272 lending*.

1. Introduction

The unprecedented magnitude of quantitative easing (QE) policies pursued by major central banks following the global financial crisis has revived the interest in international capital flows, in particular in the context of monetary spillovers.[1] Growing evidence on the dominance of the "push factors" in driving the capital flows underlies the interest in central bank policies and developments in financial centers.[2] Along these lines, Rey (2013) argues that the capital flows and credit cycles in international financial system are largely determined by the financial conditions set in the major financial centers, and that – irrespective of their exchange rate regimes – countries cannot pursue independent monetary policies unless their capital account is managed. Gathering comprehensive historical cross-country data, Reinhart and Reinhart (2009), for example, document the decisive role played by global factors for global capital flow cycles, and the close association of the latter with crises in emerging economies.

There is by now a commonly shared view that ample global liquidity boosts capital inflows in emerging markets, raising the question of international spillovers and effects of QE on the borrowing conditions of these countries. Considering the strong consequences of capital flows for recipient countries and the relative importance of bank-to-bank flows in total flows, this paper estimates both the transmission mechanism and diffusion channels (i.e., lender banks' location/nationality and currency denomination of flows) of QE policies of three major central banks.[3] In particular, we study

[1] In an attempt to mitigate the effects of the 2008 global financial crisis, central banks of major advanced economies initially cut their interest rates. However, these policies proved inadequate though policy rates hit the zero lower bound, hence the central banks started to pursue unconventional monetary policies. They employed several rounds of QE with various asset purchase programs, which resulted in abundant amount of liquidity in domestic as well as in global markets. Those operations inflated the balance sheets of the major central banks and their ratio to respective country's gross domestic product (GDP), which is an informative indicator of monetary expansion (Graph 1).

[2] Indeed, the view that push factors play a decisive role in capital flows also finds wide acceptance among policy makers. Rajan (2015) for example proposes that large central banks reinterpret their mandate in a way to internalize both the short and long term spill*over* effects of their policies, while Fischer (2015) states the importance for US policymaking of internalizing spill*back* effects of its actions.

[3] Among the various types of capital flows, credit flows are of greater importance in terms of their implications for financial stability of the recipient countries. Milesi-Ferretti and Tille (2011) finds that the countries with a higher degree of international financial integration and a higher dependence on bank flows were hit worst by the retrenchment in capital flows following the global financial crisis. Consistent with this finding, Rey (2013) documents that among different kinds of capital flows, credit flows are the most strongly related to the global financial cycle. Further decomposing the bank claims (credit flows) reveals that the bulk of bank claims are on other banks. Indeed, as underlined in the relevant literature, the link between the capital

bank-to-bank flows to Turkey. Cross-border borrowing by Turkish Banks reached to USD 141 billion as of December 2014, implying approximately a 1,300 percent increase in 12 years. Except for a short period starting from the global financial crisis and lasting one year, the upward trend in the outstanding volume of foreign funding continued uninterruptedly. Consequently, as of end-2014, the share of foreign funding in total liabilities reached 19 percent, which is a historical high (Graph 2). One should also note that, consistent with the historical observations, during this period, increased borrowing from abroad and the lending volume of the Turkish banks went hand in hand (Graph 3).[4]

With its financial markets highly integrated with world capital markets and the dominance of the domestic banking sector in channeling foreign funds to the domestic economy, the Turkish economy provides us with a suitable and representative example to investigate the monetary policy spillovers through cross-border bank flows. More importantly, our unique data set allows us to address a number of important yet unanswered questions in the extant literature. We detail these questions shortly, but first our data.

Our data set covers the period between 2008 and 2014, when QE policies were implemented by three major central banks, i.e., the Federal Reserve (Fed), the European Central Bank (ECB), and the Bank of England (BoE).[5] The sheer size of the QE operations and their direct implications for liquidity in financial markets as well as in the banking sector, make this episode relevant to evaluate the spillover effects and transmission mechanisms of monetary policies. We have access to bank-to-bank loan level data including detailed information on both the creditor and the debtor banks and on the loan terms. In particular, our data set includes balance sheet, nationality and residency information of lenders and borrowers, and individual loan maturity, currency and type. Exploiting the granularity of the data set, we answer questions currently unaddressed in the literature due to the data limitations. Hence, our results go well beyond the exploration of a single country case.

First, we analyze the quantity impact and the transmission mechanism of QE policies. In particular, we address the following three questions:

---

flows and the financial crises is mostly established through the increase in recipient countries' banking system leverage and the ensuing rapid credit growth (Lane and McQuade (2014)).

[4] The fact that the change in the volume of funds raised from abroad and FX loans extended to domestic real sector move almost one-to-one suggests that those resources were mostly lent out as FX loans.

[5] The volume of borrowing from Japanese banks and/or in Japanese yen is negligible.

(1) Do QE policies of Fed, ECB and BoE affect the size of the cross-border bank loans received by Turkish Banks?

(2) What type of lender banks in advanced countries utilize the improved liquidity conditions most?

(3) What type of borrower banks (located in Turkey) utilizes the improved liquidity conditions most?

Our data set also allows us to explore the role of the lender banks' nationality/location and the currencies in the transmission process, which we henceforth name "diffusion channels". Moreover, having the details of the loan terms, we are able to see the maturity dimension. Except for a few recent papers, such details have been missing in the literature so far.[6] Specifically, we try to deepen our understanding of the diffusion channels of spillovers by answering the additional three questions:

(4) Do lender banks located in a country other than the country where the QE policy is originating, play a role in transmitting the spillover effects of the QE policy?

(5) Is the effect of QE policy of a certain central bank limited only to the flows denominated in its respective currency?

(6) Does the increased cross-border lending resulting from the QE policies concentrate in certain maturities?

The majority of the studies related to monetary policy spillovers through cross-border bank lending focus on the United States (US) case and investigate the effects of (pre-crisis and/or post-crisis)

[6] The most recent version of the BIS International Banking Statistics data includes the nationality of lender, residence of the borrower and the currency denomination of the loans. Avdjiev, Subelytė and Takáts (2016) and Takáts and Temesváry (2018) for example utilize these new dimensions of the data in their analyses on the international monetary policy spillovers.

Fed policies on the international claims of US banks. These studies universally find that US monetary policy is one of the most important drivers of cross border lending by US banks.[7] Studies on the monetary shocks engineered by other major central banks, (ECB, BoE and Bank of Japan) also point out to a significant spillover effect through cross-border bank lending.[8]

In line with the extant literature, our analyses yield a clear and positive answer to the first question, i.e., whether QE policies of Fed, ECB and BoE significantly affect cross-border lending to Turkish banks. In addition, with respect to their effectiveness Fed QE stands out, followed by ECB and BoE QEs. Similar to the studies focusing on BoE QE, our results also imply that the sharp hike in regulatory capital adequacy ratio (CAR) coinciding with the QE substantially dampened the impact of BoE policies on cross-border lending.[9]

We investigate the transmission mechanisms (global bank lending and borrowing channels) through which QEs impact cross-border bank lending. Relying on our detailed data set, which includes bank characteristics of both lenders and borrowers, we explore the transmission mechanism from the perspective of both lenders (global lending channel) and borrowers (global borrowing channel). Our identification strategy for the international bank lending (borrowing) channel is based on Khwaja and Mian (2008), and on the proposition that less-capitalized and illiquid banks exhibit a stronger response to changes in domestic liquidity conditions than their well-capitalized and liquid peers as in Kashyap and Stein (2000). One needs to examine the same recipient bank borrowing from lender banks with different ex-ante exposures to QE in order to identify the global bank-lending channel. Similar identification strategies have also been used in the related literature, though in different contexts (e.g.,

[7] Correa and Murry (2009) documents the effects of US monetary policy on the cross-border lending of US banks. Cetorelli and Goldberg (2012a) find that monetary policy shocks in US spillover to other countries through the fund flows between the US parent banks and foreign offices. Temesváry, Ongena and Owen (2018) document the spillover effects of US monetary policy transmitted both through internal and external capital markets.

[8] Cerutti, Claessens and Ratnovski (2017) find that ECB and BoE monetary policies (represented by real policy rates and slope of the yield curve) are effective on cross-border lending, albeit substantially lower in impact compared to Fed policies. Using data from post-global financial crisis (2012-2015) period, Takáts and Temesváry (2018) show that ECB and Bank of Japan monetary policies are also stimulating cross-border bank flows. Morais, Peydró, Roldan-Pena and Ruiz-Ortega (2019) investigate the effects of policy shocks in US, Euro Area and UK on the lending of global banks headquartered in those countries to their respective banks in Mexico through their subsidiaries. For all three central banks, they document positive spillover effects through internal capital markets.

[9] Forbes, Reinhardt and Wieladek (2017) for example give a detailed description of the policies that could affect UK headquartered banks' cross-border lending despite the extremely loose monetary policy stance which followed the global financial crisis. They claim that in addition to a hike in the regulatory capital adequacy ratio (CAR), the lending for funding scheme has been also instrumental in suppressing cross-border lending of UK banks. Aiyar, Calomiris, Hooley, Korniyenko and Wieladek (2014) provide evidence on the negative effects of the CAR on cross-border lending of UK banks.

Iyer, da-Rocha-Lopes, Peydró and Schoar (2014) and Temesváry, Ongena and Owen (2018)). Having bank-level data on the borrower (lender) side at monthly frequency allowed us to confidently control for demand (supply) side factors.

Results suggest that the effect of QE policies on lending is significantly stronger for less-capitalized and liquidity-constrained lender and borrower banks. In other words, while less-capitalized and illiquid lender banks extend more loans, less-capitalized and illiquid borrower banks also acquire more loans. Therefore, we find strong evidence for the existence of global bank lending and borrowing channels. While the extant literature provides evidence on the potency of a global bank-lending channel (e.g., Cetorelli and Goldberg (2012a), Coleman, Correa, Feler and Goldrosen (2014), Ioannidou, Ongena and Peydró (2015), , Cerutti, Claessens and Ratnovski (2017), Ongena, Schindele and Vonnák (2018), Morais, Peydró, Roldan-Pena and Ruiz-Ortega (2019)), the global borrower bank channel has so far been overlooked. By introducing the actual functioning and potency of an international bank borrowing channel, our paper is the first to establish key insights from the domestic credit literature – such as the importance of the strength of borrower balance sheets and the financial accelerator (Gertler and Gilchrist (1994), Bernanke, Gertler and Gilchrist (1996)) -- in an international bank-to-bank context.

To investigate the role of lender bank location/nationality in the transmission process, we group the lender banks, first according to their country of residency (location), second with respect to their nationality (headquarters), and finally according to the location-headquarters combinations.[10] In general, our results suggest that in addition to banks located/headquartered in their own countries, QE of the Fed and the ECB also affected the cross border lending of banks, which are located/headquartered outside of the US and the Euro Area (EA), respectively.[11] However, BoE QE has been effective only on United Kingdom (UK) headquartered banks. Besides, according to our estimations, Fed QE has been more effective both in terms of the magnitude and the geographical reach of non-resident/non-native banks' cross border lending to Turkey. Furthermore, we also test

[10] See Figure 1 for a grouping of all banks according to their location-headquarters combination.
[11] As documented extensively in Avdjiev, Subelytė and Takáts (2016) and Takáts and Temesváry (2018), BIS International Banking Statistics data shows that non-US banks lend in US dollars to US or to other non-US banks. This is also the case for euro and yen cross-border bank lending, that is, both side of the euro or yen borrower-lender network, might be outside of the issuer country.

whether the cross-border lending of global banks was received primarily by their affiliates in Turkey. Our results suggest that while cross-border borrowing of US affiliated banks in Turkey for example only responded to Fed QE, in the end (and irrespective of existing ownership relationships with lender banks) all banks located in Turkey increased their borrowing during the QE period. In other words, it seems likely that both internal and external capital markets were operative in transmitting the spillover effects.

Regarding the currency dimension of international capital flows, we investigate whether QE policies in one hard currency affect international lending in another hard currency, which has not yet been investigated in the literature.[12] By using the currency dimension of the loan level data, we directly regress the loans on the QEs of the three central banks. In principle, by directly relieving the global liquidity conditions, QE policies might ease the global banks' access to liquidity. For instance, asset purchase programs of the Fed directly improved the liquidity position of the banks holding US assets. Therefore a US- or EU-headquartered bank, which now can more easily raise liquidity in US money markets, would feel more comfortable to enlarge its claims on domestic or international borrowers, in any currency. Indeed, our results confirm the existence of such a spillover effect. According to our findings, Fed QE has stimulated cross-border lending not only in US dollar (USD) but also in euro (EUR) and British pound (GBP). On the other side improved liquidity in EUR seems to be effective in USD and EUR denominated cross-border lending. Lastly, BoE QE effect is found to be limited to GBP denominated cross-border lending only.

Our estimates also provide some insight with regards to the maturity dimension of the QE induced borrowing/lending. A priori, looking from the perspective of the lender banks, and considering the "search for yield" or "risk taking channel" arguments, one might argue that QE could cause the maturities of cross-border flows to lengthen as was observed for the other margins.[13] However, our findings suggest that QE policies of all three central banks have increased almost exclusively short-term credit. This result in our view does not per se negate the existence of search for yield motive or risk

[12] Closest to our analysis are Avdjiev and Takáts (2018) and Avdjiev, Subelytė and Takáts (2016), who investigate the role of currency networks on the monetary policy spillovers through cross-border bank flows.
[13] For in-depth discussions and empirical evidence on these mechanism, see, e.g., Rajan (2006), Borio and Zhu (2012), Adrian, Etula and Shin (2017).

taking channel, but suggests that the borrower motives could also be important in determining the terms of the loans.[14]

In addition to providing fresh evidence to the existing studies, based on a novel hand collected data set, our results advance the literature on the spillovers effects of QE in three ways. First, we investigate the role of borrower bank characteristics on the transmission of QE policies with a robust identification strategy. Second, we present a very detailed picture of how nationality and location of international banks, and the currency dimension of the loans take part in the transmission of spillover effects. Last, we explore the maturity dimension of QE spillovers, which has strong implications for the financial stability of the recipient economies.

The rest of the paper is organized as follows. Section 2 specifies the empirical methodology and describes the structure of the used datasets, Section 3 discusses the estimation results, Section 4 presents various robustness tests, and Section 5 summarizes the results and provides the policy implications of our findings.

2. Data Set and Methodology

We match three novel data sets for our empirical analysis: borrowings of Turkish banks from international banks at the loan-level, balance sheets of Turkish banks, and balance sheets of lender international banks.[15] We obtain the first two data sets from the Central Bank of the Republic of Turkey (CBRT), and the last one from Fitch. All data sets cover the period of October 2008 and December 2014. While the first two data sets have a monthly frequency, the last one has a quarterly frequency.[16] The definitions of the variables, data sources, and summary statistics are given in Table 1.

Our matched data set is unique in its granularity. We merge loan-level data on borrowings of Turkish banks from international banks with the bank-level balance sheet data sets of Turkish banks and lender banks. Our data set consists of detailed information on cross-border bank loans that are originating in 157 countries from 1,030 banks or institutions in various forms such as regular credit,

[14] For istance, Avdjiev, Subelytė and Takáts (2016) find that the currency denomination of the credit flows borrowers` are determined by the preferences of borrowers.
[15] Turkish banks have to report all cross border borrowings with the minimum balance of 1,000 USD.
[16] We convert the quarterly data of lender banks and countries to monthly frequency using linear interpolation.

deposits, documentary credit, syndicated loans, securitized loans, repos and subordinated loans. In addition to the lender country and lender bank or institution, the dataset includes information on the volume, type, currency, interest rate, beginning, and maturity date of a loan. Our data set also includes information on the country of a direct lender as well as its headquarters and if available, the country of a guarantor bank. The volume of loans can be also obtained as flow and as stock.

Constructing the resultant data set was challenging. The main challenge was identifying the lender banks or institutions. Although lender country information is provided according to the ISO-Swift BIC Directory, there is no standardization (in terms of a unique identifier) related to the lender banks or institutions. We had only their names as a string variable and names were recorded in many different ways. We therefore assessed the identities of all lender banks ourselves one by one and assigned them numeric identifiers. This provided us with two assurances. First, we can control for the supply side, and second we can match the data with the balance sheet information of lender banks, which allows us to test for the existence of a global lender balance sheet channel. These careful matches of the lender banks in addition to the extensive information on loan characteristics make our dataset unique.

We use macro variables to control for the business cycles and monetary policy stance in Turkey and lender countries; therefore we can better isolate changes in QE from other changes in economic activity or monetary conditions. We use data on macro variables both for Turkey and lender countries as well as global liquidity conditions. Macro variables from Turkey include: industrial production index (as gross domestic product (GDP) is not available at the monthly frequency), domestic interest rates, inflation, and real exchange rate. Lender country variables comprise real GDP growth, inflation, policy rate of the related central bank, and real exchange rate. Global liquidity variables include VIX, US real policy rate, 3-months TED Spread of US, and total M2 growth rate of four finance centers (US, EA, UK and Japan).

Our first main objective is to understand how QE policies of major central banks affect cross-border loans of Turkish banks. To do so, we use the following model:

$$
\begin{aligned}
L_{\mathrm{ialcmft}} = \ & \beta_0 + \sum_{k=1}^{3} \beta_{\mathrm{k}} (QE)_{t-k}^{Fed} + \sum_{k=1}^{3} \gamma_{\mathrm{k}} (QE)_{t-k}^{ECB} \\
& + \sum_{k=1}^{3} \rho_{\mathrm{k}} (QE)_{t-k}^{BoE} + \boldsymbol{\xi}_1 (Bank)_{i,t-1}^{borrower} + \boldsymbol{\xi}_2 (Bank)_{l,t-1}^{lender} \\
& + \boldsymbol{\xi}_3 (Country)_{t-1}^{borrower} + \boldsymbol{\xi}_4 (Country)_{c,t-1}^{lender} \\
& + \boldsymbol{\xi}_5 (Global)_{t-1} + \lambda_{\mathrm{i}} + \alpha_a + \eta_{\mathrm{l}} + \theta_c + \mu_{\mathrm{m}} + \zeta_{\mathrm{f}} + \varepsilon_{\mathrm{ialcmft}}
\end{aligned}
\tag{1}
$$

$L_{ialcmft}$ denotes the natural logarithm of Turkish bank`s *i* monthly stock cross-border loans borrowed from country *a* and lender bank *l* with loan type *c*, maturity *m* and currency type *f* at time *t*. The QE variable denotes the quantitative easing policies of Fed, ECB and BoE, calculated as the ratio of total assets of the central banks to respective country's GDP at time t, as used by Morais, Peydró, Roldan-Pena and Ruiz-Ortega (2019). We include three lags of QE as well as its interaction terms with bank capital and liquidity ratios. The inclusion of three lags of the QE variable captures the cumulative effect of QE policies throughout the previous quarter. Similarly, the lagged values of bank ratios control past strategic choices of banks. While the use of one lag with quarterly data sets has become standard in the literature, we also repeat the analysis using six and twelve lags of the QE policies to cover previous the six months to a year, and find that our results are robust to changes in the number of lags used.[17] For robustness, we also use the yearly change in logarithmic value of stock cross-border loans as a dependent variable, and the yearly change in the QE variable as the main focus variable. We also find very similar results to our main findings with this alternative specification.

We also include the bank-specific variables for borrower and lender banks, the macroeconomic indicators related to Turkish economy and lender countries, and global liquidity indicators that have the potential to affect cross-border bank loans. λ_{i}, α_a, η_{l}, θ_c, μ_{m} and ζ_{f} denote the fixed effects for borrower bank *i*, lender country *a*, lender bank *l*, loan type *c*, maturity *m*, and currency type *f*.

[17] All the unreported estimations referred in the text are available upon request.

Our second main objective is to understand how QE is transmitted (international lending/borrowing channels) to Turkish banks via cross-border loans. Therefore, we extend our model and use the following model:

$$
\begin{aligned}
L_{\mathrm{ialcmft}} = \ & \beta_0 + \sum_{k=1}^{3} \beta_{\mathrm{k}} (QE)_{t-k}^{X} + \sum_{k=1}^{3} \gamma_{\mathrm{k}} \, (QE)_{t-k}^{X} * C_{j,t-k} \\
& + \sum_{k=1}^{3} \delta_{\mathrm{k}} \, (C)_{j,t-k} + \boldsymbol{\xi}_1 (Bank)_{i,t-1}^{borrower} + \boldsymbol{\xi}_2 (Bank)_{i,t-1}^{lender} \\
& + \boldsymbol{\xi}_3 (Country)_{t-1}^{borrower} + \boldsymbol{\xi}_4 (Country)_{c,t-1}^{lender} \\
& + \boldsymbol{\xi}_5 (Global)_{t-1} + \lambda_{\mathrm{i}} + \ \alpha_a + \eta_{\mathrm{l}} + \theta_c + \ \mu_{\mathrm{m}} + \zeta_{\mathrm{f}} + \varepsilon_{\mathrm{ialcmft}}
\end{aligned}
\tag{2}
$$

We aim to identify the channels through which QE policies of major central banks affect the Turkish banks' cross-border loans. Therefore, we include the solvency and liquidity indicators of lender or borrower banks, and their interactions with the QEs. Superscript *X* represents the three central banks (i.e., Fed, ECB and BoE) implementing the QEs. *C* denotes the lender or borrower bank's capital or liquidity ratio defined as capital or liquid assets over total assets, respectively.

Following the literature, we include three lags of net worth or liquidity ratio and their interactions in the model. We exploit these theoretically motivated interactions between economic and monetary conditions on the one hand and bank balance-sheet strength variables in order to separate bank loan supply from demand (Bernanke, Gertler and Gilchrist (1996), Kashyap and Stein (2000)). The definition of the bank capital- and liquidity-to-total-assets ratios we employ closely follows the theoretical literature that attributes a prominent role to net worth in reducing the agency costs of borrowing (Holmstrom and Tirole (1997), Holmstrom and Tirole (1998), Bernanke, Gertler and Gilchrist (1999), Gertler and Kiyotaki (2011)), which sharpens the interpretation of the coefficients on their interactions with monetary and economic conditions.

We further explore impact of QE policies on the maturity of loans using the following model:

$$
\begin{aligned}
M_{\text{ialcft}} = \beta_0 + \sum_{k=1}^{3} \beta_k (QE)_{t-k}^{Fed} + \sum_{k=1}^{3} \gamma_k (QE)_{t-k}^{ECB} \\
+ \sum_{k=1}^{3} \rho_k (QE)_{t-k}^{BoE} + \boldsymbol{\xi}_1 (Bank)_{i,t-1}^{borrower} + \boldsymbol{\xi}_2 (Bank)_{l,t-1}^{lender} \\
+ \boldsymbol{\xi}_3 (Country)_{t-1}^{borrower} + \boldsymbol{\xi}_4 (Country)_{c,t-1}^{lender} \\
+ \boldsymbol{\xi}_5 (Global)_{t-1} + \lambda_i + \alpha_a + \eta_l + \theta_c + \zeta_f + \varepsilon_{\text{ialcft}}
\end{aligned}
\tag{3}
$$

M_{ialcft} denotes the natural logarithm of the maturity of Turkish bank`s *i* monthly stock cross-border loans borrowed from country *a* and lender bank *l* with loan type *c* and currency type *f* at time *t*. The model allows estimating the direct impact of QE on the length of loans. We also extend our model to explore the transmission channels by introducing interactions terms of QE and bank variables. We use similar specifications as in Equations (1) and (2).

We need to control for demand and supply, respectively, to identify the global bank lending and borrowing channels of QE. In other words, a proper understanding of the global bank-lending channel requires isolating the demand factors and similarly global bank borrowing channel requires controlling supply factors. We therefore use *borrower bank*time fixed effects* to control demand of borrower banks such that it allows us to examine whether in the same month for the same borrower bank credit offered by different lender banks depend on QE. In this case, we also control exhaustively for unobserved time-varying borrower bank fundamentals (such as creditworthiness, balance sheet characteristics etc.). This will restrict our sample to the borrower banks that are concurrently receiving credit from at least two banks. Similarly, we use *lender bank*time* fixed effects to control supply of lender banks which allows us to explore whether spurred by QE in the same month the same lender bank differentiates lending to different borrower banks. We then also control exhaustively for unobserved time-varying lender bank fundamentals (such as risk appetite, balance sheet characteristics etc.).

We saturate our models using double interactions of macro variables with main bank variables. We interact macro variables of Turkey and the global liquidity variables with the net worth or liquidity ratio variables of lender or borrower banks (depending on the channel investigated). By doing so, we

ensure that the interaction between QE and bank net worth or liquidity ratio is not picking up effects related to other macro variables.

3. Estimation Results

We offer a solid identification for the transmission channel controlling demand of borrower banks or supply of lender banks (equation 2) using bank time fixed effects following the literature. On the other hand, one of the shortcoming of the results regarding effects of QE policies on the volume of cross-border borrowing by Turkish Banks is that they do not provide perfect causality because of lacking bank time fixed effects due to the nature of QE variable, which has only time dimension. Nevertheless, including bank time fixed effects would suppress the quantity impact of QE, which is the main purpose of those estimations in order to provide a general insight in terms of ranking of QE policies of major central banks. Nevertheless, in our estimations, we use fixed effects for borrower and lender banks, lender countries, maturities, loan and currency types to control unobservable factors. We also saturate our models using global liquidity, lender country, and Turkish macro variables as well as lender and borrower bank variables. By doing so, we strongly believe that we find solid results for the quantity impact of QE.

A. Volume Effects of QEs

Table 2 reports the estimation results of Equation (1) for the effects of QE policies on cross-border borrowing by Turkish Banks. The first three columns provide results for the total quantity effect of QEs. The following columns present QE effects through headquarters of lender banks, location of lender banks, currency, and maturity of loans, which we detail later in other sections. In all specifications, we include fixed effects for borrower and lender banks, lender countries, maturities, loan and currency types to control unobservable factors.

Starting with column 2, we saturate our model by including the macroeconomic indicators related to Turkey (industrial production index, domestic interest rates, inflation, and real exchange rate) and the lender countries (real GDP growth, inflation, policy rate of the related central bank, and real exchange rate) as well as global liquidity indicators (VIX, US real policy rate, 3-months TED Spread of US, and total M2 growth rate of four finance centers (US, EA, UK and Japan)). Column 3 provides the most saturated specification with lender and borrower bank variables: Utilizing this specification, we

then disentangle the effects of QE with respect to lender headquarters, lender location, currency and maturity dimensions in the following columns.

Cross border borrowings of Turkish banks have increased by the QE policies of major central banks to varying degrees. The first three columns show that QE policies of Fed, ECB, and BoE increased cross border borrowings of Turkish banks. The results imply that Fed QE has significantly more impact than those of ECB and BoE. Controlling for global and country specific macro variables (column 2), then adding the lender and the borrower bank variables (column 3) does not change the results. However, the significance level of BoE weakens in the most saturated specification.[18] At this point, it is worth providing some more information on the BoE case.

Several papers focusing on the effects of BoE QE, document that UK banks did not increase cross-border lending in response to BoE QE policies due to the coinciding ratcheting up of regulatory CAR and the "Lending for Funding Scheme". For example, Forbes, Reinhardt and Wieladek (2017) who investigate the UK example of "de-globalization" in cross border bank lending, show that the regulatory policies (minimum capital requirement) and unconventional policies (funding for lending scheme) and their interaction resulted in a substantial contraction in UK cross-border lending. The importance of this observation for our regressions stems from the strikingly high correlation between the minimum CAR and the BoE assets (Graph 4). Therefore, omitting the CAR might potentially yield misleading results as to the role of BoE QE on cross border loans. Indeed, when CAR is excluded the sign of the BoE QE turns to negative.

[18] There are many studies about the drivers of global cross-border bank lending, e.g., Giannetti and Laeven (2012), de Haas and van Lelyveld (2014), De Haas and Van Horen (2013), Buch, Koch and Koetter (2013), Cerutti, Hale and Minoiu (2015), McCauley, McGuire and Sushko (2015), and Cerutti, Claessens and Ratnovski (2017). However, exploring the effects of changes in monetary policies of major central banks on the global banks' cross-border lending activity has become an important research topic recently. Bremus and Fratzscher (2015) for example show that quantitative easing policies in the home countries have encouraged cross-border lending, not only in Euro Area but also in non-Euro Area countries, while Temesváry, Ongena and Owen (2018) find that quantitative easing policies of the Fed significantly increased the US banks' bilateral cross-border flows. Moreover, there also exists a rich literature that investigate lending to emerging markets more specifically, e.g., Cetorelli and Goldberg (2011), Schnabl (2012), Ongena, Peydró and van Horen (2015), Avdjiev, Subelytė and Takáts (2016). Morais, Peydró, Roldan-Pena and Ruiz-Ortega (2019) for example find that expansionary monetary policy of major central banks, Fed, ECB and BoE, increases the supply of credit of foreign banks to Mexican firms.

However, there is a caveat concerning the way we control for the CAR. In the UK, the CAR is not set as a unique ratio across the board; it is bank specific, but as the micro data is not public we have to use the average CAR. Therefore, the efficacy of this approach for the CAR depends on the degree of co-movement of the regulatory minimum ratios across the individual banks. Although we do not have the individual CAR ratios, relevant sources imply that this indeed has been the case.

We also calculate the economic impact of QE policies. A 1 standard deviation expansion in the assets held by the Fed (relative to the US GDP) causes a cumulative 5.9 (column 1) to 17.7 (column 3) percent increase in the outstanding volume of cross-border loans granted to Turkish banks. Similarly, a 1 standard deviation increase in the ECB's assets (relative to the EA GDP) increases the volume of loans by 3.2 (column 1) to 10.2 (column 3) percent. A 1 standard deviation increase in the BoE's assets leads to a cumulative 2.0 to 4.0 percent increase in cross-border borrowing of Turkish banks.

Regarding the qualitative aspect, our results confirm the findings of previous studies focusing on the implications of QE policies for international capital flows. Although the results depend on the data of a single recipient country, our unique data set allow us to control a larger set of variables i.e., identifying the loans based on borrower bank, lender country, lender bank, loan type, maturity and currency type, and controlling for the time-variant and -invariant effects stemming from these parameters.[19]

The granularity of our data allows us to differentiate the cross border bank flows across various dimensions. We analyze the impact of QE policies in terms of nationality and location of the lender banks, currency denomination of the loans and finally maturity of the loans (Table 2, columns 4-14). USD has always been the dominant currency in Turkish Banks' foreign borrowing. Its share has further increased after 2010 (Graph 5a and 5b). Moreover, the largest portion of cross-border bank flows directed to Turkey from EA and UK headquartered and/or located banks are denominated in USD (Graphs 6a to 9b). In terms of the location of the lender banks, UK located banks lead the volume of

[19] To our knowledge our work is the first to take into account the QE policies of all three central banks simultaneously, and then document the effects on the cross-border banks loans in an emerging market. Moreover, the strong financial linkages of Turkish banks with these three regions make Turkey an excellent empirical laboratory to identify and compare the effects of major central banks' unconventional monetary policies.

intermediation, followed by EA and US located banks (Graphs 10a, 10b and 11b). In sum, most of the USD denominated debt of Turkish banks is granted by UK and EA located banks. Furthermore, majority of those lender banks (which are based in UK or EA) are not headquartered in US (Graphs 6a, 6b, 11a and 11b).

Shin (2012) points out the dominant role of the European banks in intermediating funds from the US to the rest of the world, and emphasizes that cross-border banking has been closely associated with the activity of European global banks that borrow in US dollars from money market funds in the US. Similarly, Cerutti, Claessens and Ratnovski (2017) find that US monetary policy and EA and UK bank conditions play a significant role in driving global financial cycles.

Our results accord with those findings; we find that Fed policies have been effective in stimulating cross-border bank flows (received by Turkish Banks) regardless of headquarters and/or location of lender banks. Indeed, take the headquarters, which are the most relevant location of decision-making in many global banks (e.g., Cetorelli and Goldberg (2012b)), columns 4 to 6 show that, Fed QE is found to be more effective on the cross-border lending of EA and UK headquartered banks than it is on US banks. The impact range of ECB QE is narrower than that of Fed; as only EA and UK headquartered banks are found to respond to ECB easing. BoE QE has the weakest impact on cross-border flows, as the BoE spillovers are transmitted through UK headquartered banks only. In quantitative terms, a 1 standard deviation expansion in the assets held by the Fed increases the loans from banks headquartered in US, EA and UK by 7.4, 14.4 and 19.5 percent, respectively. Therefore, we can conclude that compared to ECB and BoE, QE policies implemented by the Fed have made the most significant contribution to loosen global liquidity conditions, especially through UK headquartered banks.

Columns 7 to 9 provide results through location of lender banks. The Fed has a strong effect through US or UK located banks, but a weak impact through EA located banks. The ECB and BoE have the strongest impact through UK located banks; some weak effects through EA located banks, but no effect through US located banks. In section F, we provide more detailed estimation results for headquarter-location pairs.

The importance of currency networks in cross-border bank lending is studied in the literature. For example, Bruno and Shin (2015) show the international role of the USD and the transmission of US funding and monetary shocks to foreign banks' balance sheet. As mentioned above, we find the Fed to

be the strongest central bank to affect cross-border flows, and USD loans to be the most responsive loans to the QEs. In addition to that we also explore how cross-border bank flows (independent of the location of lender banks) denominated in different currencies, namely USD, EUR and GBP, were affected by the three different central banks. The dominant role of Fed QE also emerges in the currency dimension of the flows.

Table 2 columns 10 to 12 show that Fed QE has a strong impact on USD and EUR denominated flows but a weak impact on GBP denominated flows. ECB QE in addition to EUR denominated flows increases USD flows as well; however ECB QE has no effect on the GBP denominated flows. On the other hand, BoE QE has the narrowest range of influence such that only GBP denominated flows are stimulated by BOE policies.

One noteworthy observation on those findings is that Fed QE has a relatively stronger impact on EUR flows compared to ECB QE. This could be another manifestation of the findings stressing that Fed policies plays a crucial role for global liquidity conditions. With the Fed QE, representing an unprecedented example of Fed loosening, liquidity conditions for US and non-US headquartered banks improved substantially. This in turn bolstered the intermediary capacity of all global banks regardless of their location and enabled them to grant more loans in any currency.

The last two columns in Table 2 present the results for the maturity dimension of the cross-border borrowing by Turkish banks. We find that QE policies of the Fed, ECB and BoE, have been effective almost exclusively on short-term credit. Only Fed QE is found to affect long-term credit, however with a relatively lower magnitude and a weaker statistical significance. In quantitative terms, a 1 standard deviation expansion in the assets held by the Fed, ECB and BoE cause a cumulative 21.0, 8.7 and 5.2 percent increase in short-term credit, respectively. On the other hand, ECB and BoE have no impact at all on long-term credit. Considering the increased demand for longer maturities in the bond market following the QE policies, our findings might be regarded at odds with the search for yield channel of capital flows.[20] In subsequent sections, we pursue additional analyses to better understand this finding.

[20] Feyen, Ghosh, Kibuuka and Farazi (2017) finds a positive relationship between the size of the Fed`s balance sheet and the maturity of emerging and developing economy corporate and sovereign bonds.

B. Transmission Mechanism: Supply Side Channels

Various transmission mechanisms were proposed to explain the link between QE policies and international capital flows. Risk taking and search for yield are commonly accepted as potential drivers of capital flows. In addition to these two motives, the volume effect through the bank-lending channel has also been conjectured to be important in observed spillover effects through cross-border loans. Our data set allows us to test for the existence of the bank-lending channel by using a comprehensive set of controls made possible by the granularity of the data.[21]

Table 3 reports estimation results of Equation (2), (as explained in section 2) for the global bank-lending channel of QE policies. The first four columns present the results of the specifications where bank balance sheet strength is captured by capital ratio and in last four columns liquidity ratio replaces the capital ratio. We investigate the transmission mechanism by including the interaction of the QE with the capital ratio and subsequently with the liquidity ratio of the lender banks. We control the demand side by including *borrower bank-time* fixed effects, which enables us to identify the supply side and to verify the existence of a global bank-lending channel. In all the specifications, we include fixed effects for lender countries, maturities, loan and currency types to control for unobservable factors.[22] We saturate our models by including the set of explanatory variables gradually; in column 2 we include lender country variables, in column 3 we control for lender bank variables, on top of these, in column 4 we include the interaction of lender bank's capital ratio with all macroeconomic indicators in order to control for the business cycles or monetary conditions of Turkey and global liquidity conditions. We exactly apply the same specifications and followed the same steps when we replace the capital ratio with the liquidity ratio columns 5 through 8.

[21] By bank-lending channel, we do not refer to the mechanism described in Bernanke and Blinder (1988), whereby central bank affect the amount of deposit through changes in reserves. Instead, we mean the positive effect of quantitative policies on the liquidity conditions in financial markets.

[22] In this estimation one needs to control for the changes in CAR for UK banks, as sharp increases in this regulatory threshold might have presented a binding constraint for some banks. In this case, our setting would not be suitable to test bank lending channel. Hence, in order to improve the reliability of our results, in the estimations we excluded the UK banks with capital ratios lower than the average CAR. Although not necessary, for the sake of consistency we did the same filtering for the demand channel estimations, where we investigate the relation between borrower characteristics and the tendency to borrow.

We use the capital ratio of lender banks as the main bank variable (columns 1 to 4). We find that the bank-lending channel was operative in transmitting the effects of QE policies of the Fed, ECB, and BoE. The interaction term (QE and capital ratio) is negative, as expected, at standard levels of significance. This result implies that banks with lower capital ratios increase their lending more compared to their well-capitalized counterparts. This result is in line with the related literature. To give an idea on the economic relevancy of the bank lending channel; the impact of a 1 standard deviation increase in Fed QE is 4.0 to 10.5 percent higher for less-capitalized banks (at the 25th percentile of the capital ratio) compared to well-capitalized banks (at the 75th percentile of the capital ratio). Similarly, the impact of a 1 standard deviation increase in ECB QE is 2.7 to 8.0 percent higher for less-capitalized banks compared to well-capitalized banks. The impact for BoE QE is 5.9 to 6.2 percent higher for less-capitalized banks compared to well-capitalized banks.

We then replace the capital ratio with the liquidity ratio (columns 5 to 8). The results again strongly imply the existence of bank lending channel. In other words, liquidity constrained lender banks exhibit a stronger response to QE than their liquidity-abundant counterparts. Quantitatively speaking, the impact of a 1 standard deviation increase in QE of Fed is 5.7 to 12.3 percent higher for illiquid banks (at the 25th percentile of liquidity distribution) compared to liquidity-abundant banks (at the 75th percentile of liquidity). Similarly, ECB QE has a higher impact of 4.5 to 6.3 percent, while BoE QE 7.5 to 7.3 percent, for illiquid banks compared to liquidity-abundant banks.

C. Transmission Mechanism: Demand Side Channels

Our data set also enables us to extend our study to assess the role of borrower bank characteristics in the transmission of monetary policy spillovers. Therefore, we take one further step towards exploring the demand side or the existence of the "global borrowing channel" by controlling for the supply side of credit using *lender bank-time* fixed effect. Our earlier results establish that QE policies spur lender banks to supply cross border credit; i.e., the augmentation of liquidity by QE policies are transmitted to Turkish banks. With the exercises in this section, we try to assess whether the liquidity transmission differs across the receiving borrower banks according to their balance sheet strength. To the best of our knowledge, our paper is the first to document the working of a "global borrowing channel" through

cross-border bank flows. By exploring differentiation across the demand side, our results will complement the findings of aforementioned studies.[23]

We investigate the transmission mechanism by including the interaction of the QE with the capital ratio or liquidity ratio of borrower banks. Table 4 reports the estimation results for Equation (2), but this time it is the borrower bank balance sheet variables, which are interacted with the QEs. The first four columns present results for the specification where the balance sheet strength is represented by capital ratio and the last four columns presents the results where liquidity ratio replaces the capital ratio in the same specification.

Table 4, columns 1 to 4 expand the set of explanatory variables gradually in each column to test the "global borrowing channel" using the capital ratio of borrower banks. We control for the supply side effects by including *lender bank-time* fixed effects. The interaction terms (QE*borrower bank ratio), are the focus of interest here as a statistically significant negative sign would confirm the existence of "global bank borrowing". The interaction term obtain a negative and significant sign for all studied QEs. Hence, the results suggest that less capitalized banks tend to borrow more in response to QE policies (while also the potential relevance of Eurodollar markets is again apparent). In other words, the results provide us with strong evidence for the existence and potency of a global bank-borrowing channel. The impact of a 1 standard deviation increase in Fed QE is 5.6 percent higher for less-capitalized (25^{th}) banks compared to well-capitalized (75^{th}) ones. Similarly, the impact of a 1 standard deviation increase in ECB QE is 7.5 percent higher for less-capitalized (25^{th}) banks compared to well-capitalized (75^{th}) ones. A 1 standard deviation increase in BoE QE increased loans by 5.3 percent more of less-capitalized (25^{th}) banks compared to well-capitalized (75^{th}) ones. We can summarize that ECB QE has the largest impact among those central banks.

The columns 5 to 8 in Table 4 provide the results where the balance sheet strength of borrowers represented by the liquidity ratio. Similar to the previous results, we find that liquidity constrained borrower banks exhibit a stronger response to QE than their liquidity-abundant counterparts. The impact of a 1 standard deviation increase in QE of Fed, ECB, and BoE is 6.8, 9.5 and 8.8 percent higher

[23] The exploration of the differentiation of the liquidity transmission across borrowers is technically constrained if all lenders provide credit to many borrowers. In that case saturation with lender (-time) fixed effects is less potent in accounting for all supply effects. In our application the number of borrowers per lender is fairly limited.

for illiquid (25th) borrower banks compared to liquid ones (75th), respectively. All in all, both exercises suggest that global borrowing channel exists.

D. Lender and Borrower Banks: Birds of a Feather Flock Together?

In the previous section, we show the existence of global bank lending and borrowing channels. In other words, results suggest that the cross-border flows of capital/liquidity-constrained lender and borrower banks are affected by QE policies of major central banks significantly more than their capital/liquidity-abundant counterparts. At this point, we analyze whether constrained lender banks extend loans more to the constrained or unconstrained borrower banks. Therefore, in Table 5, we check the channels through which the QE policies of Fed, ECB and BoE affect the lender and borrower banks with varying capital and liquidity ratios by including triple interaction of the QE with the lender and borrower bank's respective ratios simultaneously.

Columns 1 and 2 represent the results for the capital ratio. Results suggest that while less capitalized lender banks extend more credit to the less capitalized borrower banks, more capitalized lender banks extend more credit to the more capitalized borrower banks with QE policies of Fed, ECB and BoE. Columns 3 and 4 provide the results for the liquidity ratio. Similarly, liquidity-constrained lender banks extend more credit to the liquidity-constrained borrower banks; liquidity-abundant lender banks extend more credit to the liquidity-abundant borrower banks with the QE policies.

We can conclude that banks with weak capital structure or low liquid asset ratio that could not borrow at the desired level during illiquid period due to their weak ratios start to search for yield and borrow more during when the liquidity conditions become more favorable as a result of expansionary monetary policies of major central banks. At the same time, not only relatively weak borrower banks but also relatively weak lender banks start to search for yield and lend more during this liquid period. More strikingly, the increased borrowing and lending relationship in this period mainly stem from the relation between liquidity-constrained lender and borrower banks that both have weak ratios.

E. Maturity of Cross-Border Loans: Another Dimension of Risk Taking for Borrowers?

We investigate the drivers of the changes in the maturity dimension of cross border loans by using average maturity of the cross border flows as the dependent variable in Equation 3 and extending the

set of explanatory variables by including the interaction of lender and borrower bank characteristic with the QEs (Table 6). In line with the results in Table 2 (columns 13 and 14), we find that QE induced flows have relatively shorter maturities (columns 1 and 2 of Table 6). Quantitatiely, a 1 standard deviation increase in the assets held by the Fed for example decreases the maturity of newly borrowed loans by around 6 months.[24] Indeed, sector level data presented in Graph 12a also confirm the disproportional increase in short-term versus long-term cross border borrowing in the aftermath of the QE policies.

Ostensibly, looking from the lenders' side, this result is at odds with the "search for yield" argument, which, however proves to be right in the case of emerging market corporate and sovereign bonds (Feyen, Ghosh, Kibuuka and Farazi (2017)).

At this point, a natural question would be who drives the changes in maturities; lenders or borrowers?[25] Table 6 provides some information that allows us to make some tentative comments. On the lenders' side, weak liquidity ratios and weak capital structures are found to be associated with more short-term lending (columns 3 to 6). It could be the case that while banks with weaker liquidity / capital positions, as envisaged by international bank lending channel, increased the volume of cross-border lending, but they refrained from taking risk on the maturity dimension i.e., preferred to lend in shorter maturities.[26]

The results presented in columns 7 to 10 of Table 6 show that on the borrowers' side, and symmetrical to our previous findings, weaker liquidity / capital position are found to be associated with shorter cross-border loan maturities. However, the loan maturities are much more sensitive to

[24] A 1 standard deviation increase in the assets held by Fed, ECB and BoE causes a cumulative 11.4, 3.2 and 4.0 percent decrease in the length of maturity, respectively.

[25] The Fed's monetary policy may have substantial spillovers in emerging markets' credit cycles such as excessive bank risk-taking (Rey (2013)). Expansive monetary policy rates may promote higher risk-taking by banks and other financial institutions due to the search-for-yield incentives (e.g., Adrian and Shin (2011), Allen and Rogoff (2011), Borio and Zhu (2012), Dell'Ariccia, Laeven and Marquez (2014), Jiménez, Ongena, Peydró and Saurina (2014), Ioannidou, Ongena and Peydró (2015), Dell'Ariccia, Laeven and Suarez (2017)).

[26] The impact of a 1 standard deviation increase in the assets held by Fed, ECB and BoE on the length of maturity is 6.2, 3.3, and 6.1 percent higher for less-capitalized banks compared to well-capitalized banks, respectively. Moreover, the percentage change in the maturity for a 1 standard deviation increase in QEs of Fed, ECB and BoE are 3.4, 3.2, and 3.7 percent higher for illiquid banks than for liquid banks, respectively.

borrower bank characteristic than they are to those of lender banks.[27] In our setting, it is not possible to identify whether this is because weaker banks are not able to borrow at longer maturities or it simply reflects their preferences. Aggregated figures of the sector imply that the short-term FX liquidity positions of the banks, measured by short-term assets over short-term liabilities, were mostly deteriorating throughout the estimation period (Graph 12b). Independent of which side's preference dominates the maturity outcome, this picture clearly points to increased risk taking by the borrower banks, as borrower banks are not adjusting their FX assets according to the increased short-term FX liabilities. Those findings have important implications for the financial stability consequences of monetary-policy spillovers.

F. A Closer Look at the Lender Bank Locations

In order to understand the monetary policy spillovers, it is also important to find out which banking systems via which locations conduit the liquidity conditions to the recipient countries. Previously, we handled the location and the nationality of lender banks separately in the main results. Assuming that headquarters are the main decision making unit of the global banks, previous findings imply that the EA and the UK banks play a substantial role in the transmission of US QE policies. In other words these banking systems intermediary capacity is important for the transmission of the Fed induced policy changes.

We advance the analysis by matching the location and the nationality of banks.[28] In other words, we separate the lender banks into nine groups according to the nationality-location combinations. The estimation results are presented in Appendix, Table 1a. Figure 2 also provides an illustrative representation of the estimation results.

Fed QE increases the lending of all nine groups; i.e., irrespective of their headquarters and location, all banks increase their lending to Turkish banks. Another notable finding is that US headquartered banks channel their funding mostly through EA and UK located subsidiaries. ECB QE is effective on all

[27] The impact of a 1 standard deviation increase in QEs of Fed, ECB, and BoE on maturity is 7.3, 4.4, and 9.7 percent higher for less-capitalized banks compared to well-capitalized banks, respectively.

[28] Unlike other previous studies, Avdjiev, Subelytė and Takáts (2016) distinguish among the headquarters of the lending banks. In this regards, to identify lenders, we need to identify not only the location of lender banks but also the location of headquarters of these banks.

headquarters (US, UK and EU), however through the UK and the EU located affiliates of these banks, with the exception of the EU headquartered banks, which increase its lending also through US located affiliates. In other words, among US located banks, only the EA headquartered ones responded to the ECB QE. On the other hand, BoE QE has been effective only on EA and UK headquartered banks in the UK (the only exception being the UK headquartered and US located banks).

The currency breakdown of the loans with respect to the different headquarters complements the picture drawn by the location estimations. Together these results lend strong support against the "triple coincidence" assumption.[29] Graphs 7a and 7b show the amount of USD and EUR denominated loans of US headquartered and based banks, respectively. In the aftermath of the QE policies, US banks increased USD denominated funding to Turkey located banks, while the increase in EUR denominated loans has been more limited. Graphs 8a and 8b indicate the amount of USD and EUR denominated loans of EA based and headquartered banks, respectively. The graphs clearly show that in the aftermath of the QE policies, EA headquartered and located banks increased not only USD but also EUR denominated funding to the Turkey based banks. Graphs 9a and 9b show that similar to EA, UK headquartered and located banks increased both USD and EUR denominated lending to Turkey located banks.

To see the drivers of lending by the various combinations of nationalities and currencies, we divided the loans according into 9 groups. Appendix Table 1b reports the estimation results while Figure 3 presents a visual representation of the results. We find that Fed QE increases cross-border lending from all three headquarters in all three currencies. ECB QE increases EUR lending through all three headquarters. It also increases lending of USD and GBP denominated loans through EA headquartered banks (presumably lending in Eurodollars). BoE have been effective through GBP denominated loans borrowed from banks headquartered in EA and EUR denominated loans borrowed from banks headquartered in UK.

We also investigate the role of the recipient banks' affiliation in the increased volume of cross-border borrowing, in other words, the relative role of internal capital markets versus external capital markets. To explore this question with our data set, we first separate the borrower banks in Turkey

[29] For an authoritative critique of the "triple coincidence" concept, see Avdjiev, McCauley and Shin (2016).

with regards to their partnership structure (as depicted in Figure 4). Appendix Table 1c reports the estimation results for the effects of QE policies on the loans borrowed by the affiliates of US, EA and UK headquartered banks, respectively, while Figure 5 provides the summary of the estimation results. The estimates suggest that Fed QE increased lending not only to affiliates of US banks but also affiliates of EA or UK banks or the banks headquartered in Turkey. On the other hand, ECB QE does not have any effect on US affiliated banks, but works through affiliates of EA or UK banks as well as the Turkish banks. Similarly, BoE QE works only through affiliates of EA or UK banks as well as the Turkish banks.

Our results partially diverge from those of Morais, Peydró, Roldan-Pena and Ruiz-Ortega (2019), who for the case of Mexico, finds that monetary policy shocks induced by major central banks spill over through the lending of headquarters in the source country to their subsidiaries in Mexico (i.e., U.S. monetary policy affects the credit supply of US banks' subsidiaries located in Mexico).

4. Robustness Checks

A possible concern with our results is that we use the natural logarithm of the stock of cross-border loans. To further check for robustness, we re-estimate all main results using the yearly change in logarithmic value of stock cross-border loans as a dependent variable, and the yearly change in the ratio of total assets to respective country's GDP as an explanatory variable. The results indicate that our main findings are mostly robust to this alteration.

We estimate similar specifications as in Table 2. Robustness Table 1a represents the results. The estimation output tabulated in columns 1 and 2 cover all cross-border bank loans, while in the subsequent columns loans are separated according to headquarters of the lender banks (columns 3 through 5), location of banks (columns 6 through 8), currency denomination of the loans (columns 9 through 11), and maturity of the loans (columns 12 and 13), respectively. Columns 1 and 2 show that QE policies of Fed, ECB and BoE increase cross-border loans received by Turkish banks. Column 3 shows that FED QE is strongly effective through all headquarters. Column 4 indicates that ECB QE is strongly effective through EA and weakly effective through UK, but not effective through US headquartered banks. Column 5 shows that BoE QE is weakly effective through UK headquartered banks. Columns 6 through 8 suggest that Fed and ECB QE are effective in stimulating cross-border bank lending through all three regions. However, BoE QE is not effective from the location point of view.

All in all, our estimates suggest that QE policies pursued by the Fed and ECB had significant repercussions beyond their borders. Columns 9 through 11 show that the QE policy of the Fed affects all USD, EUR and GBP denominated flows. ECB has impact on the USD and EUR denominated loans and BoE has impact on the EUR and GBP denominated loans. Columns 12 and 13 indicate that QE policies of Fed, ECB and BoE have been effective on short-term lending. On the other hand, only Fed QE has a weak impact on the long-term borrowing with very small economic impact compared to the one on short-term borrowing.

Overall, similar to previous results, estimates indicate that QE policies of major central banks have significant impacts on cross-border bank loans, and QE policies pursued by Fed and ECB had significant repercussions beyond their borders.

Secondly, we estimate the same specifications as in Tables 3 and 4, which show the existence of lending and borrowing channels. Robustness Tables 1b and 1c represents the results for lending and borrowing channels, as in Table 3 and 4, respectively. Robustness Table 1b provides us a strong evidence of the global bank-lending channel in cross-border bank loans using capital or liquidity ratios interchangeably. Columns 1 and 2 show that less-capitalized lender banks exhibit a stronger response to the QE policies than their well-capitalized counterparts. Moreover, columns 3 through 4 indicate that liquidity constrained lender banks exhibit a stronger response to the QE than their liquidity-abundant counterparts.

Robustness Table 1c provides us a strong evidence of the global bank-borrowing channel in cross-border bank loans using capital or liquidity ratios interchangeably. Columns 1 and 2 show that less-capitalized borrower banks exhibit a stronger response to the QE than their well-capitalized peers. Moreover, Columns 3 and 4 indicate that liquidity constrained borrower banks exhibit a stronger response to the QE than their liquidity-abundant counterparts. Overall, similar to previous results, the results with new specifications provide us a strong evidence of the global bank lending and borrowing channels in cross-border bank loans.

5. Conclusion

Focusing on the QE policies of Fed, ECB and BoE, this paper traces the spillover effects of monetary policies through cross-border bank loans received by banks located in Turkey. Employing unique loan

level data and detailed information on the nationality, location, and balance sheet of both lender and borrower banks, we conduct an in-depth analysis of monetary policy spillovers. We analyze the quantity impact and the transmission mechanism of QE policies. We further explore QE policies in terms of location of banks, currency and maturity of loans. This investigation deepens our understanding of the diffusion channels of QE.

We find that QE policies of Fed, ECB and BoE significantly affect cross-border lending to Turkish banks. In addition, with respect to their effectiveness Fed QE stands out, followed by ECB and BoE QEs. We also provide a novel approach to study the transmission mechanism of QE as we investigate the credit channel from the perspective of the lenders as well as the borrowers (to the best of our knowledge, the latter has not been investigated before). Our identification strategy is based on the presumption that less-capitalized and illiquid banks exhibit a stronger response to changes in liquidity conditions than their counterparts. We find that less-capitalized and illiquid lender banks expand their lending more following QE policies. Similarly, on the borrower banks side, our results suggest that less-capitalized and illiquid banks utilize the improved credit conditions more. In addition to increased borrowing, the characteristics of lenders and borrowers should also be of concern for the financial stabilization of the recipient countries and lenders as well, as when overall liquidity conditions reverse the weaker lenders and borrowers will be the ones hit most.

In addition to spurring cross-border credit independently of country fundamentals, all QE policies are found to increase – almost exclusively short-term – lending / borrowing. Besides, according to the estimations, both on the lenders and the borrowers' side weaker capital and liquidity positions are found to be significantly associated with short-term lending and borrowing. This finding present yet another reason why bank-to-bank flows, boosted in favorable global liquidity conditions might be accumulating risks for both lenders and borrowers.

With respect to the diffusion channels, we find that: (i) Fed and ECB QE spur cross border lending even from banks not headquartered and/or not located in the source country, whereas BoE QE is effective only for UK headquartered banks; (ii) QE policies might increase lending in other currencies, as improved liquidity conditions in a major currency (particularly USD) might mean increased intermediary capacity for lender banks. Dominance of the Fed QE prevails over the currency dimension as well: Fed QE stimulates lending in all three currencies, whereas ECB QE stimulates lending in USD

and EUR albeit smaller in magnitude and BoE QE is effective only on GBP denominated loan flows; (iii) increased borrowing by recipient banks was not limited to the affiliates of the global banks; indeed all banks located in Turkey increased their cross-border borrowing irrespective of their affiliation. By showing the Fed's unmatched impact on international lending and stressing the importance of European and UK banks in transmitting the spillovers, our results echo Cerutti, Claessens and Ratnovski (2017). Our results also correspond to Avdjiev, Subelytė and Takáts (2016) who show the importance of currency networks in transmitting the spillovers of major central bank and thus provides support to the views against the assumption of the "triple coincidence" (Avdjiev, McCauley and Shin (2016) .

References

Adrian, T., Etula, E., Shin, H.S., 2017. Risk Appetite and Exchange Rates. Federal Reserve Bank of New York, New York NY.

Adrian, T., Shin, H.S., 2011. Financial Intermediaries and Monetary Economics. In: Friedman BM & Woodford M (eds.) Handbook of Monetary Economics 3A. Elsevier, New York NY, pp. 601-650.

Aiyar, S., Calomiris, C.W., Hooley, J., Korniyenko, Y., Wieladek, T., 2014. The International Transmission of Bank Capital Requirements: Evidence from the UK. Journal of Financial Economics 113, 368-382.

Allen, F., Rogoff, K., 2011. Asset Prices, Financial Stability and Monetary Policy. In: Jansson P & Persson M (eds.) The Riksbank's Inquiry into the Risks in the Swedish Housing Market. Sveriges Riksbank, Stockholm, pp. 189-218.

Avdjiev, S., McCauley, R.N., Shin, H.S., 2016. Breaking Free of the Triple Coincidence in International Finance. Economic Policy 31, 409-451.

Avdjiev, S., Subelytė, A., Takáts, E., 2016. The ECB's QE and Euro Cross-border Bank Lending. BIS Quarterly Review, 99-119.

Avdjiev, S., Takáts, E., 2018. Monetary Policy Spillovers and Currency Networks in Cross-border Bank Lending: Lessons from the 2013 Fed Taper Tantrum. Review of Finance, Forthcoming.

Bernanke, B.S., Gertler, M., Gilchrist, S., 1996. The Financial Accelerator and the Flight to Quality. Review of Economics and Statistics 78, 1-15.

Bernanke, B.S., Gertler, M., Gilchrist, S., 1999. The Financial Accelerator in a Quantitative Business Cycle Framework. In: Taylor J & Woodford M (eds.) Handbook of Macroeconomics. Elsevier, Amsterdam, pp. 1341-1393.

Borio, C., Zhu, H., 2012. Capital Regulation, Risk-Taking and Monetary Policy: A Missing Link in the Transmission Mechanism. Journal of Financial Stability 8, 236-251.

Bremus, F., Fratzscher, M., 2015. Drivers of Structural Change in Cross-border Banking since the Global Financial Crisis. Journal of International Money and Finance 52, 32-59.

Bruno, V., Shin, H.S., 2015. Cross-Border Banking and Global Liquidity. Review of Economic Studies 82, 535-564.

Buch, C., Koch, C., Koetter, M., 2013. Do Banks Benefit from Internationalization? Revisiting the Market Power-Risk Nexus. Review of Finance 17, 1401-1435.

Cerutti, E., Claessens, S., Ratnovski, L., 2017. Global Liquidity and Cross-Border Banking Flows. Economic Policy 32, 81-125.

Cerutti, E., Hale, G., Minoiu, C., 2015. Financial Crises and the Composition of Cross-border Lending. Journal of International Money and Finance 52, 60-81.

Cetorelli, N., Goldberg, L.S., 2011. Global Banks and International Shock Transmission: Evidence from the Crisis. IMF Economic Review 59, 41-76.

Cetorelli, N., Goldberg, L.S., 2012a. Banking Globalization and Monetary Transmission. Journal of Finance 67, 1811-1843.

Cetorelli, N., Goldberg, L.S., 2012b. Liquidity Management of U.S. Global Banks: Internal Capital Markets in the Great Recession. Journal of International Economics 88, 299-311.

Coleman, N., Correa, R., Feler, L., Goldrosen, J., 2014. Unconventional Monetary Policy Spillovers and Local Credit Provision. Federal Reserve Board, Washington DC.

Correa, R., Murry, C., 2009. Is There a Cross-border Bank Lending Channel? Evidence from US Banks' International Exposure. In: Kohn DL (ed.) Research on Global Financial Stability: The Use of

BIS International Financial Statistics. Committee on the Global Financial System - Bank for International Settlements, Basle, pp. 114-132.
De Haas, R., Van Horen, N., 2013. Running for the Exit: International Bank Lending During a Financial Crisis. Review of Financial Studies 26, 244-285.
de Haas, R., van Lelyveld, I., 2014. Multinational Banks and the Global Financial Crisis: Weathering the Perfect Storm? Journal of Money, Credit and Banking 46, 333-364.
Dell'Ariccia, G., Laeven, L., Suarez, G.A., 2017. Bank Leverage and Monetary Policy's Risk-Taking Channel: Evidence from the United States. Journal of Finance 72, 613-654.
Dell'Ariccia, G., Laeven, L., Marquez, R., 2014. Real Interest Rates, Leverage, and Bank Risk-Taking. Journal of Economic Theory 149, 65-99.
Feyen, E., Ghosh, S., Kibuuka, K., Farazi, S., 2017. Global Liquidity and External Bond Issuance in Emerging Markets and Developing Economies. World Bank, Washington DC.
Fischer, S., 2015. The Federal Reserve and the Global Economy. Tel Aviv University, Tel Aviv.
Forbes, K., Reinhardt, D., Wieladek, T., 2017. The Spillovers, Interactions, and (Un)Intended Consequences of Monetary and Regulatory Policies. Journal of Monetary Economics 85, 1-22.
Gertler, M., Gilchrist, S., 1994. Monetary Policy, Business Cycles, and the Behavior of Small Manufacturing Firms. Quarterly Journal of Economics 109, 309-340.
Gertler, M., Kiyotaki, N., 2011. Financial Intermediation and Credit Policy in Business Cycle Analysis. In: Friedman BM & Woodford M (eds.) Handbook of Monetary Economics 3A. Elsevier, New York NY, pp. 547-599.
Giannetti, M., Laeven, L., 2012. The Flight Home Effect: Evidence from the Syndicated Loan Market During Financial Crises. Journal of Financial Economics 104, 23-43.
Holmstrom, B., Tirole, J., 1997. Financial Intermediation, Loanable Funds, and the Real Sector. Quarterly Journal of Economics 112, 663-691.
Holmstrom, B., Tirole, J., 1998. Private and Public Supply of Liquidity. Journal of Political Economy 106, 1-40.
Ioannidou, V.P., Ongena, S., Peydró, J.-L., 2015. Monetary Policy, Risk-Taking and Pricing: Evidence from a Quasi-Natural Experiment. Review of Finance 19, 95-144.
Iyer, R., da-Rocha-Lopes, S., Peydró, J.-L., Schoar, A., 2014. The Interbank Liquidity Crunch and the Firm Credit Crunch: Evidence from the 2007-09 Crisis. Review of Financial Studies 24, 2121-2165.
Jiménez, G., Ongena, S., Peydró, J.-L., Saurina, J., 2014. Hazardous Times for Monetary Policy: What Do Twenty-Three Million Bank Loans Say about the Effects of Monetary Policy on Credit Risk-Taking? Econometrica 82 463-505.
Kashyap, A.K., Stein, J.C., 2000. What Do A Million Observations on Banks Say About the Transmission of Monetary Policy? American Economic Review 90, 407-428.
Khwaja, A.I., Mian, A., 2008. Tracing the Impact of Bank Liquidity Shocks: Evidence from an Emerging Market. American Economic Review 98, 1413-1442.
Lane, P.R., McQuade, P., 2014. Domestic Credit Growth and International Capital Flows. Scandinavian Journal of Economics 116, 218-252.
McCauley, R.N., McGuire, P., Sushko, V., 2015. Global Dollar Credit: Links to US Monetary Policy and Leverage. Economic Policy 30, 187-229.
Milesi-Ferretti, G.-M., Tille, C., 2011. The Great Retrenchment: International Capital Flows during the Global Financial Crisis. Economic Policy 26, 289-346.

Morais, B., Peydró, J.-L., Roldan-Pena, J., Ruiz-Ortega, C., 2019. The International Bank Lending Channel of Monetary Policy Rates and QE: Credit Supply, Reach-for-Yield, and Real Effects. Journal of Finance 74, 55-90.

Ongena, S., Peydró, J.L., van Horen, N., 2015. Shocks Abroad, Pain at Home? Bank-Firm Level Evidence on Financial Contagion during the Recent Financial Crisis. IMF Economic Review 63 698-750.

Ongena, S., Schindele, I., Vonnák, D., 2018. In Lands of Foreign Currency Credit, Bank Lending Channels Run Through? University of Zurich, Zurich.

Rajan, R., 2015. Competitive Monetary Easing: Is It Yesterday Once More? Macroeconomics and Finance in Emerging Market Economies 8, 5-16.

Rajan, R.G., 2006. Has Finance Made the World Riskier? European Financial Management 12, 499-533.

Reinhart, C.M., Reinhart, V.R., 2009. Capital Flow Bonanzas: An Encompassing View of the Past and Present. In: Frankel JA & Pissarides C (eds.) International Seminar on Macroeconomics. University of Chicago Press, Chicago.

Rey, H., 2013. Dilemma not Trilemma: The Global Financial Cycle and Monetary Policy Independence. Federal Reserve Bank of Kansas City Proceedings - Economic Policy Symposium - Jackson Hole, 285-333.

Schnabl, P., 2012. The International Transmission of Bank Liquidity Shocks: Evidence from an Emerging Market. Journal of Finance 67, 897-932.

Shin, H.S., 2012. Global Banking Glut and Loan Risk Premium. IMF Economic Review 60, 155-192.

Takáts, E., Temesváry, J., 2018. The Currency Dimension of the Bank Lending Channel in International Monetary Transmission. Bank for International Settlements, Basel.

Temesváry, J., Ongena, S., Owen, A.L., 2018. A Global Lending Channel Unplugged? Does U.S. Monetary Policy Affect Cross-border and Affiliate Lending by Global U.S. Banks? Journal of International Economics 112, 50-69.

Table 1
Summary Statistics

Variable Names	Definition	Source	N	Mean	SD	Min.	10%	25%	50%	75%	90%	Max.
Dependent Variables												
The Amount of Cross-border Bank Loans	The natural logarithm of Turkish banks' stock cross-border loans (Million USD) borrowed from country ***a*** and lender bank ***l*** with loan type ***c*** , maturity ***m*** and currency type ***f*** at time ***t***	CBRT	198,873	7.23	3.42	0.00	1.95	4.73	7.88	9.90	11.18	14.87
Maturity of Cross-border Loans	The natural logarithm of maturity (in days) of Turkish banks' stock cross-border loans borrowed from country ***a*** and lender bank ***l*** with loan type ***c*** and currency type ***f*** at time ***t***	CBRT	128,838	5.17	1.97	0.00	1.95	4.40	5.89	5.90	7.50	10.48
Independent Variables												
Fed`s QE	Ratio of Federal Reserve`s total balance sheet assets to US GDP	Fed	75	18.66	3.68	13.58	14.69	15.63	18.02	21.29	25.20	25.61
ECB`s QE	Ratio of European Central Bank`s total balance sheet assets to Euro Area GDP	ECB	75	23.05	3.93	18.94	19.53	20.21	21.22	24.71	30.33	31.57
BoE`s QE	Ratio of Bank of England`s total balance sheet assets to UK GDP	BoE	75	18.88	4.01	11.44	14.73	15.28	17.31	22.97	23.64	24.77
UK's CAR	Quarterly change in the UK-resident banks' capital requirements that refer to both Pillar 1 and Pillar 2.	BoE	75	0.05	0.34	-0.95	-0.14	-0.05	0.00	0.07	0.36	1.21
Global Liquidity Variables												
VIX	CBOE S&P 500 volatility index	Bloomberg	75	22.32	10.17	11.40	13.52	15.51	18.43	25.92	36.50	59.89
Δ US real policy rate	Monthly change in the US real effective federal funds rate	Bloomberg	75	0.03	0.53	-2.00	-0.50	-0.20	0.00	0.30	0.50	2.60
US TED Spread	3-months TED spread (LIBOR - Treasury bill)	Bloomberg	75	0.38	0.48	0.12	0.16	0.19	0.22	0.37	0.64	3.35
Total M2 growth	Total M2 growth rate of four financial centers (US, EA, UK and Japan)	Bloomberg	75	3.31	4.11	-3.09	-1.46	0.37	2.51	5.94	8.96	13.84
Lender Country Variables												
Real GDP Growth	Yearly change in real GDP	Bloomberg	6,889	2.41	4.47	-9.80	-2.90	0.04	2.40	4.90	7.40	17.79
Inflation Rate	Yearly change in consumer price index	Bloomberg	6,897	4.23	5.63	-2.30	0.09	1.20	2.80	5.28	9.40	38.04
Δ Policy Rate	Monthly change in policy interest rate	Bloomberg	6,252	-0.04	0.48	-6.41	-0.25	0.00	0.00	0.00	0.00	8.30
Δ REER	Monthly change in real effective exchange rate	Bloomberg	5,235	0.02	1.70	-5.92	-1.72	-0.71	0.00	0.79	1.89	5.57
Turkey(TR) Macro Variables												
Δ Industrial Production	Yearly change in industrial production index	TurkStat	75	3.29	10.02	-23.98	-9.94	-1.18	4.61	9.73	14.40	23.92
Inflation Rate	Yearly change in consumer price index	TurkStat	75	7.89	1.79	3.99	5.33	6.40	7.89	9.19	10.19	11.99
Δ BIST o/n Interest Rate	Monthly change in Istanbul Stock Exchange (BIST) over/night interest rate	TurkStat	75	-0.11	0.65	-1.65	-0.99	-0.36	-0.06	0.06	0.55	2.57
Δ REER	Monthly change in real effective exchange rate based on consumer price index	TurkStat	75	-0.26	2.76	-11.80	-3.63	-1.45	-0.05	1.42	3.16	5.62
Lender Bank Variables												
Lender Bank Capital Ratio	Capital divided by total assets	Fitch	45,538	0.13	0.13	0.01	0.04	0.06	0.09	0.14	0.23	0.78
Lender Bank Liquidity Ratio	Bank liquid assets divided by total assets (liquid assets = trading securities and at FV through income + loans and advances < 3 months + loans and advances to banks < 3 months)	Fitch	36,308	0.14	0.17	0.00	0.00	0.01	0.07	0.20	0.36	0.82
Lender Bank Total Assets	The natural logarithm of total bank assets	Fitch	45,538	10.53	3.31	1.06	6.20	8.04	10.52	12.67	14.59	22.11
Lender Bank Credit Ratio	Total loans divided by total assets	Fitch	44,752	0.50	0.22	0.00	0.16	0.35	0.54	0.66	0.74	0.88
Lender Bank Deposit Ratio	Total deposits divided by total assets	Fitch	42,721	0.57	0.24	0.00	0.20	0.43	0.62	0.76	0.83	0.91
Lender Bank ROA Ratio	Bank net profit divided by total assets	Fitch	43,859	0.01	0.02	-0.07	0.00	0.00	0.01	0.01	0.02	0.06
Lender Bank NPL Ratio	Bank non-performing loans divided by bank total loans	Fitch	31,842	0.07	0.09	0.00	0.01	0.02	0.04	0.08	0.15	0.55

Table 1 (continued)

Variable Names	Definition	Source	N	Mean	SD	Min.	10%	25%	50%	75%	90%	Max.
Borrower Bank Variables												
Borrower Bank Capital Ratio	Capital divided by total assets	CBRT	2,221	0.17	0.13	0.04	0.09	0.11	0.13	0.16	0.28	0.95
Borrower Bank Liquidity Ratio	Selected FX liquid assets divided by total assets (Selected FX liquid assets = cash + foreign banks(free) + receivables from CBRT, interbank money market, reverse repo transactions)	CBRT	2,221	0.13	0.13	0.00	0.03	0.05	0.10	0.16	0.27	0.80
Borrower Bank Total Assets	The natural logarithm of real total bank assets	CBRT	2,221	10.64	2.02	5.73	8.24	9.16	10.36	12.47	13.39	13.77
Borrower Bank Credit Ratio	Total loans divided by total assets	CBRT	2,221	0.47	0.21	0.00	0.09	0.33	0.55	0.63	0.68	0.83
Borrower Bank Deposit Ratio	Total deposits divided by total assets	CBRT	2,221	0.46	0.24	0.00	0.04	0.25	0.56	0.62	0.68	0.84
Borrower Bank ROA Ratio	Bank net profit divided by total assets	CBRT	2,221	0.02	0.02	-0.10	0.00	0.01	0.01	0.02	0.03	0.15
Borrower Bank NPL Ratio	Bank non-performing loans divided by bank total loans	CBRT	2,143	0.05	0.06	0.00	0.01	0.02	0.04	0.06	0.10	0.55
US-resident Lender Bank Variables												
Lender Bank Capital Ratio	Capital divided by total assets	Fitch	1,005	0.14	0.13	0.01	0.05	0.07	0.08	0.15	0.31	0.65
Lender Bank Liquidity Ratio	Bank liquid assets divided by total assets (liquid assets = trading securities and at FV through income + loans and advances < 3 months + loans and advances to banks < 3 months)	Fitch	837	0.16	0.19	0.00	0.00	0.02	0.09	0.22	0.54	0.81
Lender Bank Total Assets	The natural logarithm of total bank assets	Fitch	1,005	10.31	3.67	4.47	5.36	7.94	9.64	12.04	16.68	19.52
Lender Bank Credit Ratio	Total loans divided by total assets	Fitch	1,005	0.47	0.19	0.01	0.23	0.27	0.50	0.64	0.67	0.75
Lender Bank Deposit Ratio	Total deposits divided by total assets	Fitch	990	0.62	0.23	0.00	0.26	0.47	0.69	0.80	0.86	0.90
Lender Bank ROA Ratio	Bank net profit divided by total assets	Fitch	978	0.01	0.02	-0.07	0.00	0.00	0.01	0.02	0.02	0.06
Lender Bank NPL Ratio	Bank non-performing loans divided by bank total loans	Fitch	633	0.07	0.10	0.00	0.01	0.01	0.03	0.10	0.15	0.55
EA-resident Lender Bank Variables												
Lender Bank Capital Ratio	Capital divided by total assets	Fitch	9,342	0.10	0.09	0.01	0.04	0.06	0.08	0.12	0.17	0.78
Lender Bank Liquidity Ratio	Bank liquid assets divided by total assets (liquid assets = trading securities and at FV through income + loans and advances < 3 months + loans and advances to banks < 3 months)	Fitch	7,818	0.12	0.16	0.00	0.00	0.01	0.05	0.18	0.32	0.82
Lender Bank Total Assets	The natural logarithm of total bank assets	Fitch	9,342	10.64	3.04	2.60	6.31	8.71	10.68	12.51	14.57	20.57
Lender Bank Credit Ratio	Total loans divided by total assets	Fitch	9,183	0.52	0.21	0.00	0.18	0.38	0.57	0.67	0.75	0.88
Lender Bank Deposit Ratio	Total deposits divided by total assets	Fitch	8,958	0.59	0.24	0.00	0.22	0.48	0.66	0.77	0.84	0.91
Lender Bank ROA Ratio	Bank net profit divided by total assets	Fitch	8,967	0.01	0.02	-0.07	-0.01	0.00	0.01	0.01	0.02	0.06
Lender Bank NPL Ratio	Bank non-performing loans divided by bank total loans	Fitch	6,438	0.07	0.10	0.00	0.01	0.02	0.04	0.08	0.16	0.55
UK-resident Lender Bank Variables												
Lender Bank Capital Ratio	Capital divided by total assets	Fitch	6,234	0.12	0.11	0.01	0.05	0.06	0.09	0.14	0.24	0.78
Lender Bank Liquidity Ratio	Bank liquid assets divided by total assets (liquid assets = trading securities and at FV through income + loans and advances < 3 months + loans and advances to banks < 3 months)	Fitch	4,950	0.14	0.18	0.00	0.00	0.01	0.06	0.20	0.39	0.82
Lender Bank Total Assets	The natural logarithm of total bank assets	Fitch	6,234	10.45	3.03	3.81	6.30	7.91	10.46	12.82	14.05	19.25
Lender Bank Credit Ratio	Total loans divided by total assets	Fitch	6,201	0.50	0.21	0.00	0.15	0.38	0.56	0.67	0.72	0.88
Lender Bank Deposit Ratio	Total deposits divided by total assets	Fitch	6,072	0.57	0.24	0.00	0.18	0.46	0.61	0.76	0.84	0.91
Lender Bank ROA Ratio	Bank net profit divided by total assets	Fitch	6,087	0.01	0.02	-0.07	0.00	0.00	0.01	0.02	0.03	0.06
Lender Bank NPL Ratio	Bank non-performing loans divided by bank total loans	Fitch	4,353	0.07	0.09	0.00	0.01	0.02	0.04	0.07	0.15	0.55

Table 2

The Effects of QE Policies on Turkish Banks' Cross-border Borrowing for All Banks and across Countries, Bank, Currency and Maturities

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Headquarter of Lender Banks	All	All	All	**US**	**EA**	**UK**	All	All	All	All	All	All	All	All
Location of Lender Banks	All	All	All	All	All	All	**US**	**EA**	**UK**	All	All	All	All	All
Currency	All	All	All	All	All	All	All	All	All	**USD**	**EUR**	**GBP**	All	All
Included Maturities	All	All	All	All	All	All	All	All	All	All	All	All	**≤ 1 Year**	**> 1 Year**
Σ Fed`s QE{t-1 to t-3}	0.016***	0.026***	0.048***	0.020**	0.039***	0.053**	0.036**	0.035*	0.046***	0.053***	0.032***	0.032*	0.057**	0.018*
	[0.003]	[0.008]	[0.010]	[0.010]	[0.015]	[0.024]	[0.017]	[0.019]	[0.016]	[0.010]	[0.008]	[0.020]	[0.023]	[0.010]
Σ ECB`s QE{t-1 to t-3}	0.008***	0.015***	0.026***	0.020	0.014*	0.022*	0.016	0.016*	0.030***	0.013**	0.012**	-0.018	0.022**	-0.004
	[0.002]	[0.004]	[0.005]	[0.015]	[0.009]	[0.012]	[0.012]	[0.009]	[0.008]	[0.006]	[0.005]	[0.017]	[0.009]	[0.011]
Σ BoE`s QE{t-1 to t-3}	0.005*	0.011***	0.010*	-0.015	-0.002	0.011*	-0.001	0.014*	0.010**	0.001	0.015	0.039*	0.013*	0.031
	[0.003]	[0.004]	[0.005]	[0.017]	[0.009]	[0.008]	[0.018]	[0.008]	[0.005]	[0.010]	[0.011]	[0.020]	[0.008]	[0.020]
Constant	7.089***	2.611***	1.606	-4.464	-7.494***	10.299**	-1.906	-2.985	9.310**	19.172***	-2.451	17.134	-8.508***	10.967***
	[0.173]	[0.704]	[1.707]	[4.125]	[2.427]	[4.675]	[4.178]	[2.468]	[3.901]	[2.403]	[3.234]	[15.965]	[2.134]	[2.363]
Σ UK`s CAR{t-1 to t-3}	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender Country Fixed Effects	Yes	Yes	Yes	No	Yes	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Lender Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Type Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Currency Type Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes
Loan Maturity Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Global Liquidity Variables	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender Country Variables	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
TR Macro Variables	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender Bank Variables	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Bank Variables	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.658	0.648	0.628	0.635	0.667	0.630	0.744	0.698	0.674	0.516	0.624	0.874	0.541	0.664
Number of Observations	198,873	123,915	83,494	16,120	29,907	12,559	11,185	27,118	16,436	32,956	22,520	1,489	49,366	34,128
Δ% in loans with Fed:	5.89	9.57	17.66	7.36	14.35	19.50	13.25	12.88	16.93	19.50	11.77	11.77	20.97	6.62
Δ% in loans with ECB:	3.15	5.90	10.23	7.87	5.51	8.66	6.29	6.29	11.80	5.11	4.72	-7.08	8.66	-1.57
Δ% in loans with BoE:	2.00	4.41	4.01	-6.01	-0.80	4.41	-0.40	5.61	4.01	0.40	6.01	15.62	5.21	12.42

Note. -- The table reports estimates from ordinary least squares regressions. The dependent variable is the natural logarithm of Turkish banks' cross-border borrowing (from countries and lender banks with different loan types, maturities and currency types). Table 1 contains the definition of all variables and the summary statistics for each included variable. Global Liquidity Variables are the VIX, the monthly change in the US real policy rate, the 3-months US TED Spread and total M2 growth rate of four financial centers (US, EA, UK, Japan). Lender Country Variables are real GDP growth, inflation rate, monthly change in policy rate and monthly change in real effective exchange rate. Turkey (TR) Macro Variables are yearly change in industrial production index, inflation rate, monthly change in BIST o/n interest rate and monthly change in real effective exchange rate. Lender Bank Variables include the lagged values of Bank Total Assets, Capital Ratio, Liquidity Ratio, Credit Ratio, Deposit Ratio, ROA Ratio and NPL Ratio. Borrower Bank Variables include the lagged values of Bank Total Assets, Capital Ratio, Liquidity Ratio, Credit Ratio, Deposit Ratio, ROA Ratio and NPL Ratio. Analysis covers the period of 2008:M10 – 2014:M12. Coefficients are listed in the first row, robust standard errors are reported in the row below, and the corresponding significance levels are placed adjacently. Σ indicates sum of the three coefficients on the indicated lag terms (and corresponding standard errors and significance level). "Yes" indicates set of characteristics or fixed effects. "No" indicates set of characteristics or fixed effects is not included. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Table 3

The Global Lending Channel: The Impact of QE Policies on Turkish Banks' Cross-border Borrowing with Varying Capital or Liquidity Ratios of Lender Banks

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lender Bank Ratio	**Capital Ratio**				**Liquidity Ratio**			
Σ (Fed`s QE * Lender Bank Ratio) {t-1 to t-3}	-0.140***	-0.120**	-0.324***	-0.369***	-0.081***	-0.125***	-0.191***	-0.176***
	[0.035]	[0.057]	[0.09]	[0.106]	[0.025]	[0.031]	[0.037]	[0.044]
Σ (ECB`s QE * Lender Bank Ratio) {t-1 to t-3}	-0.090**	-0.033	-0.168*	-0.263*	-0.060***	-0.078***	-0.094***	-0.084**
	[0.044]	[0.064]	[0.097]	[0.144]	[0.020]	[0.025]	[0.030]	[0.033]
Σ (BoE`s QE * Lender Bank Ratio) {t-1 to t-3}	-0.191***	-0.025	-0.232*	-0.199***	-0.098***	-0.113***	-0.125***	-0.096*
	[0.064]	[0.101]	[0.151]	[0.067]	[0.029]	[0.036]	[0.043]	[0.053]
Σ Lender Bank Ratio {t-1 to t-3}	-0.931	-1.187	1.693	3.737	1.195***	2.229***	3.542***	3.772***
	[0.77]	[1.094]	[2.004]	[3.921]	[0.452]	[0.551]	[0.659]	[1.056]
Lender Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Bank Fixed Effects	-	-	-	-	-	-	-	-
(Borrower Bank*Month) Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Type Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Currency Type Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Maturity Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Global Liquidity Variables	-	-	-	-	-	-	-	-
Lender Country Variables	No	Yes	Yes	Yes	No	Yes	Yes	Yes
TR Macro Variables	-	-	-	-	-	-	-	-
Lender Bank Variables	No	No	Yes	Yes	No	No	Yes	Yes
Borrower Bank Variables	-	-	-	-	-	-	-	-
Global Liquidity Variables*Lender Bank Ratio	No	No	No	Yes	No	No	No	Yes
TR Macro Variables*Lender Bank Ratio	No	No	No	Yes	No	No	No	Yes
R2	0.658	0.648	0.637	0.593	0.656	0.640	0.636	0.636
Number of Observations	124,874	89,233	73,354	73,354	112,059	84,629	73,019	73,019
Δ% in loans by lower (25%) vs. higher (75%) capitalized or liquid lender banks with the 1 s.d. increase in the QE of								
Fed:	-3.98	-3.41	-9.22	-10.50	-5.66	-8.74	-13.35	-12.30
ECB:	-2.74	-1.00	-5.11	-8.00	-4.49	-5.83	-7.03	-6.28
BoE:	-5.91	-0.77	-7.18	-6.16	-7.46	-8.60	-9.51	-7.31

Note. -- The table reports estimates from ordinary least squares regressions. The dependent variable is the natural logarithm of Turkish banks' cross-border borrowing (from countries and lender banks with different loan types, maturities and currency types) for lender banks with different capital or liquidity ratios. Table 1 contains the definition of all variables and the summary statistics for each included variable. Global Liquidity Variables are the VIX, the monthly change in the US real policy rate, the 3-months US TED Spread and total M2 growth rate of four financial centers (US, EA, UK, Japan). Lender Country Variables are real GDP growth, inflation rate, monthly change in policy rate and monthly change in real effective exchange rate. Turkey (TR) Macro Variables are yearly change in industrial production index, inflation rate, monthly change in BIST o/n interest rate and monthly change in real effective exchange rate. Lender Bank Variables include the lagged values of Bank Total Assets, Capital Ratio, Liquidity Ratio, Credit Ratio, Deposit Ratio, ROA Ratio and NPL Ratio. Borrower Bank Variables include the lagged values of Bank Total Assets, Capital Ratio, Liquidity Ratio, Credit Ratio, Deposit Ratio, ROA Ratio and NPL Ratio. Analysis covers the period of 2008:M10 – 2014:M12. Coefficients are listed in the first row, robust standard errors are reported in the row below, and the corresponding significance levels are placed adjacently. Σ indicates sum of the three coefficients on the indicated lag terms (and corresponding standard errors and significance level). "Yes" indicates set of characteristics or fixed effects. "No" indicates set of characteristics or fixed effects is not included. "-" indicates that the indicated set of characteristics or fixed effects are comprised in the wider included set of fixed effects. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Table 4

The Global Borrowing Channel: The Impact of QE Policies on Turkish Banks' Cross-border Borrowing with Varying Capital or Liquidity Ratios of Borrower Banks

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Borrower Bank Ratio	**Capital Ratio**				**Liquidity Ratio**			
Σ (Fed`s QE * Borrower Bank Ratio) {t-1 to t-3}	-0.247***	-0.336***	-0.282***	-0.268**	-0.070***	-0.111**	-0.163**	-0.167***
	[0.052]	[0.070]	[0.077]	[0.112]	[0.024]	[0.045]	[0.083]	[0.055]
Σ (ECB`s QE * Borrower Bank Ratio) {t-1 to t-3}	-0.124*	-0.341***	-0.270***	-0.332***	-0.137***	-0.125***	-0.130**	-0.219***
	[0.070]	[0.091]	[0.095]	[0.098]	[0.041]	[0.049]	[0.055]	[0.060]
Σ (BoE`s QE * Borrower Bank Ratio) {t-1 to t-3}	-0.038	-0.235***	-0.205**	-0.230***	-0.150***	-0.104**	-0.100**	-0.199***
	[0.124]	[0.084]	[0.086]	[0.093]	[0.021]	[0.050]	[0.049]	[0.054]
Σ Borrower Bank Ratio {t-1 to t-3}	7.317***	14.139***	13.588***	15.176***	-0.658	2.032**	2.878	2.169
	[2.439]	[3.166]	[3.328]	[5.073]	[0.488]	[0.935]	[1.869]	[2.641]
Lender Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender Bank Fixed Effects	-	-	-	-	-	-	-	-
(Lender Bank*Month) Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Type Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Currency Type Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Maturity Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Global Liquidity Variables	-	-	-	-	-	-	-	-
Lender Country Variables	No	Yes	Yes	Yes	No	Yes	Yes	Yes
TR Macro Variables	-	-	-	-	-	-	-	-
Lender Bank Variables	-	-	-	-	-	-	-	-
Borrower Bank Variables	No	No	Yes	Yes	No	No	Yes	Yes
Global Liquidity Variables*Borrower Bank Ratio	No	No	No	Yes	No	No	No	Yes
TR Macro Variables*Borrower Bank Ratio	No	No	No	Yes	No	No	No	Yes
R2	0.671	0.650	0.651	0.651	0.671	0.650	0.651	0.651
Number of Observations	172,965	102,869	102,648	102,648	172,943	102,857	102,643	102,643
Δ% in loans by lower (25%) vs. higher (75%) capitalized or liquid borrower banks with the 1 s.d. increase in the QE of								
Fed:	-5.19	-7.06	-5.93	-5.63	-2.85	-4.52	-6.64	-6.80
ECB:	-2.79	-7.67	-6.07	-7.46	-5.97	-5.45	-5.66	-9.54
BoE:	-0.87	-5.38	-4.69	-5.26	-6.65	-4.61	-4.44	-8.83

Note. -- The table reports estimates from ordinary least squares regressions. The dependent variable is the natural logarithm of Turkish banks' cross-border borrowing (from countries and lender banks with different loan types, maturities and currency types) for borrower banks with different capital or liquidity ratios. Table 1 contains the definition of all variables and the summary statistics for each included variable. Global Liquidity Variables are the VIX, the monthly change in the US real policy rate, the 3-months US TED Spread and total M2 growth rate of four financial centers (US, EA, UK, Japan). Lender Country Variables are real GDP growth, inflation rate, monthly change in policy rate and monthly change in real effective exchange rate. Turkey (TR) Macro Variables are yearly change in industrial production index, inflation rate, monthly change in BIST o/n interest rate and monthly change in real effective exchange rate. Lender Bank Variables include the lagged values of Bank Total Assets, Capital Ratio, Liquidity Ratio, Credit Ratio, Deposit Ratio, ROA Ratio and NPL Ratio. Borrower Bank Variables include the lagged values of Bank Total Assets, Capital Ratio, Liquidity Ratio, Credit Ratio, Deposit Ratio, ROA Ratio and NPL Ratio. Analysis covers the period of 2008:M10 – 2014:M12. Coefficients are listed in the first row, robust standard errors are reported in the row below, and the corresponding significance levels are placed adjacently. Σ indicates sum of the three coefficients on the indicated lag terms (and corresponding standard errors and significance level). "Yes" indicates set of characteristics or fixed effects. "No" indicates set of characteristics or fixed effects is not included. "-" indicates that the indicated set of characteristics or fixed effects are comprised in the wider included set of fixed effects. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Table 5

The Global Lending and Borrowing Channels: The Impact of QE Policies on Turkish Banks' Cross-border Borrowing with Varying Capital or Liquidity Ratios of Lender and Borrower Banks

	(1)	(2)	(3)	(4)
	Lender & Borrower Banks			
Bank Ratio	**Capital Ratio**		**Liquidity Ratio**	
Σ (Fed`s QE * Lender Bank Ratio * Borrower Bank Ratio) {t-1 to t-3}	0.868***	4.803**	2.061***	2.569***
	[0.276]	[2.220]	[0.325]	[0.370]
Σ (ECB`s QE * Lender Bank Ratio * Borrower Bank Ratio) {t-1 to t-3}	2.481**	2.083***	1.619***	2.010***
	[1.221]	[0.472]	[0.221]	[0.249]
Σ (BoE`s QE * Lender Bank Ratio * Borrower Bank Ratio) {t-1 to t-3}	1.047	2.141***	3.234***	4.159***
	[1.717]	[0.680]	[0.436]	[0.51]
Lender Country Fixed Effects	Yes	Yes	Yes	Yes
Lender Bank Fixed Effects	-	-	-	-
(Lender Bank*Month) Fixed Effects	Yes	Yes	Yes	Yes
Borrower Bank Fixed Effects	-	-	-	-
(Borrower Bank*Month) Fixed Effects	Yes	Yes	Yes	Yes
Loan Type Fixed Effects	Yes	Yes	Yes	Yes
Currency Type Fixed Effects	Yes	Yes	Yes	Yes
Loan Maturity Fixed Effects	Yes	Yes	Yes	Yes
Global Liquidity Variables	-	-	-	-
Lender Country Variables	No	Yes	No	Yes
TR Macro Variables	-	-	-	-
Lender Bank Variables	-	-	-	-
Borrower Bank Variables	-	-	-	-
Global Liquidity Variables*(Lender/Borrower Banks Ratio)	No	Yes	No	Yes
TR Macro Variables*(Lender/Borrower Banks Ratio)	No	Yes	No	Yes
R2	0.666	0.653	0.664	0.648
Number of Observations	117,258	83,810	105,710	79,834

Note. -- The table reports estimates from ordinary least squares regressions. The dependent variable is the natural logarithm of Turkish banks' cross-border loans (from countries and lender banks with different loan types, maturities and currency types) for lender and borrower banks with different ratios. Table 1 contains the definition of all variables and the summary statistics for each included variable. Global Liquidity Variables are the VIX, the monthly change in the US real policy rate, the 3-months US TED Spread and total M2 growth rate of four financial centers (US, EA, UK, Japan). Lender Country Variables are real GDP growth, inflation rate, monthly change in policy rate and monthly change in real effective exchange rate. Turkey (TR) Macro Variables are yearly change in industrial production index, inflation rate, monthly change in BIST o/n interest rate and monthly change in real effective exchange rate. Lender Bank Variables include the lagged values of Bank Total Assets, Capital Ratio, Liquidity Ratio, Credit Ratio, Deposit Ratio, ROA Ratio and NPL Ratio. Borrower Bank Variables include the lagged values of Bank Total Assets, Capital Ratio, Liquidity Ratio, Credit Ratio, Deposit Ratio, ROA Ratio and NPL Ratio. Analysis covers the period of 2008:M10 – 2014:M12. Coefficients are listed in the first row, robust standard errors are reported in the row below, and the corresponding significance levels are placed adjacently. Σ indicates sum of the three coefficients on the indicated lag terms (and corresponding standard errors and significance level). "Yes" indicates set of characteristics or fixed effects. "No" indicates set of characteristics or fixed effects is not included. "-" indicates that the indicated set of characteristics or fixed effects are comprised in the wider included set of fixed effects. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Table 6

The Effects of QE Policies on the Maturity of Turkish Banks' Cross-border Borrowing

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
			Lending Channels				**Borrowing Channels**			
Bank Ratio			**Capital Ratio**		**Liquidity Ratio**		**Capital Ratio**		**Liquidity Ratio**	
Σ Fed`s QE{t-1 to t-3}	-0.022***	-0.031***								
	[0.001]	[0.005]								
Σ ECB`s QE{t-1 to t-3}	-0.004**	-0.008**								
	[0.002]	[0.003]								
Σ BoE`s QE{t-1 to t-3}	-0.005***	-0.010***								
	[0.002]	[0.003]								
Σ (Fed`s QE * Lender Bank Ratio) {t-1 to t-3}			0.036**	0.217***	0.021***	0.049***				
			[0.017]	[0.066]	[0.006]	[0.018]				
Σ (ECB`s QE * Lender Bank Ratio) {t-1 to t-3}			0.018	0.108*	0.026**	0.043**				
			[0.022]	[0.056]	[0.013]	[0.020]				
Σ (BoE`s QE * Lender Bank Ratio) {t-1 to t-3}			0.022	0.198***	0.024**	0.049***				
			[0.024]	[0.070]	[0.011]	[0.019]				
Σ Lender Bank Ratio {t-1 to t-3}			-0.188	-0.487	0.163	0.305				
			[0.45]	[1.57]	[0.258]	[0.466]				
Σ (Fed`s QE * Borrower Bank Ratio) {t-1 to t-3}							0.161***	0.349***	0.059*	0.156***
							[0.033]	[0.098]	[0.034]	[0.048]
Σ (ECB`s QE * Borrower Bank Ratio) {t-1 to t-3}							0.268***	0.195**	0.059**	0.084**
							[0.055]	[0.091]	[0.029]	[0.041]
Σ (BoE`s QE * Borrower Bank Ratio) {t-1 to t-3}							0.214***	0.423***	0.150***	0.127**
							[0.063]	[0.107]	[0.044]	[0.063]
Σ Borrower Bank Ratio {t-1 to t-3}							1.932**	5.769***	3.396***	1.828*
							[0.754]	[2.11]	[0.49]	[1.059]
Constant	7.254***	-7.156***								
	[0.302]	[1.276]								
Σ UK`s CAR{t-1 to t-3}	Yes	Yes	-	-	-	-	-	-	-	-
Lender Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	-	-	-	-
(Lender Bank*Month) Fixed Effects	No	No	No	No	No	No	Yes	Yes	Yes	Yes
Borrower Bank Fixed Effects	Yes	Yes	-	-	-	-	Yes	Yes	Yes	Yes
(Borrower Bank*Month) Fixed Effects	No	No	Yes	Yes	Yes	Yes	No	No	No	No
Loan Type Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Currency Type Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Maturity Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Global Liquidity Variables	No	Yes	-	-	-	-	-	-	-	-
Lender Country Variables	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
TR Macro Variables	No	Yes	-	-	-	-	-	-	-	-
Lender Bank Variables	No	Yes	No	Yes	No	Yes	-	-	-	-
Borrower Bank Variables	No	Yes	-	-	-	-	No	Yes	No	Yes
(Global Liquidity/TR Macro Variables)*Lender Bank Ratio	No	No	No	Yes	No	Yes	No	Yes	No	Yes
(Global Liquidity/TR Macro Variables)*Borrower Bank Ratio	No	No	No	Yes	No	Yes	No	Yes	No	Yes
R2	0.757	0.771	0.806	0.807	0.808	0.806	0.775	0.814	0.775	0.813
Number of Observations	128,838	62,291	88,231	53,387	81,231	53,174	111,154	74,673	111,132	74,668
Δ% in loans with Fed:	-8.09	-11.41	1.02	6.17	1.47	3.43	3.38	7.34	2.40	6.36
Δ% in loans with ECB:	-1.57	-3.15	0.55	3.28	1.94	3.21	6.02	4.38	2.57	3.66
Δ% in loans with BoE:	-2.00	-4.01	0.68	6.13	1.83	3.73	4.90	9.68	6.65	5.63

Note. -- The table reports estimates from ordinary least squares regressions. The dependent variable is the natural logarithm of maturity of Turkish banks' new cross-border borrowing (from countries and lender banks with different loan and currency types). Table 1 contains the definition of all variables and the summary statistics for each included variable. Global Liquidity Variables are the VIX, the monthly change in the US real policy rate, the 3-months US TED Spread and total M2 growth rate of four financial centers (US, EA, UK, Japan). Lender Country Variables are real GDP growth, inflation rate, monthly change in policy rate and monthly change in real effective exchange rate. Turkey (TR) Macro Variables are yearly change in industrial production index, inflation rate, monthly change in BIST o/n interest rate and monthly change in real effective exchange rate. Lender Bank Variables include the lagged values of Bank Total Assets, Capital Ratio, Liquidity Ratio, Credit Ratio, Deposit Ratio, ROA Ratio and NPL Ratio. Borrower Bank Variables include the lagged values of Bank Total Assets, Capital Ratio, Liquidity Ratio, Credit Ratio, Deposit Ratio, ROA Ratio and NPL Ratio. Analysis covers the period of 2008:M10 – 2014:M12. Coefficients are listed in the first row, robust standard errors are reported in the row below, and the corresponding significance levels are placed adjacently. Σ indicates sum of the three coefficients on the indicated lag terms (and corresponding standard errors and significance level). "Yes" indicates set of characteristics or fixed effects. "No" indicates set of characteristics or fixed effects is not included. "-" indicates that the indicated set of characteristics or fixed effects are comprised in the wider included set of fixed effects. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Figure 1: Regional Analysis of QE Policies (Separation of Lender Banks According to Location and Headquarter)

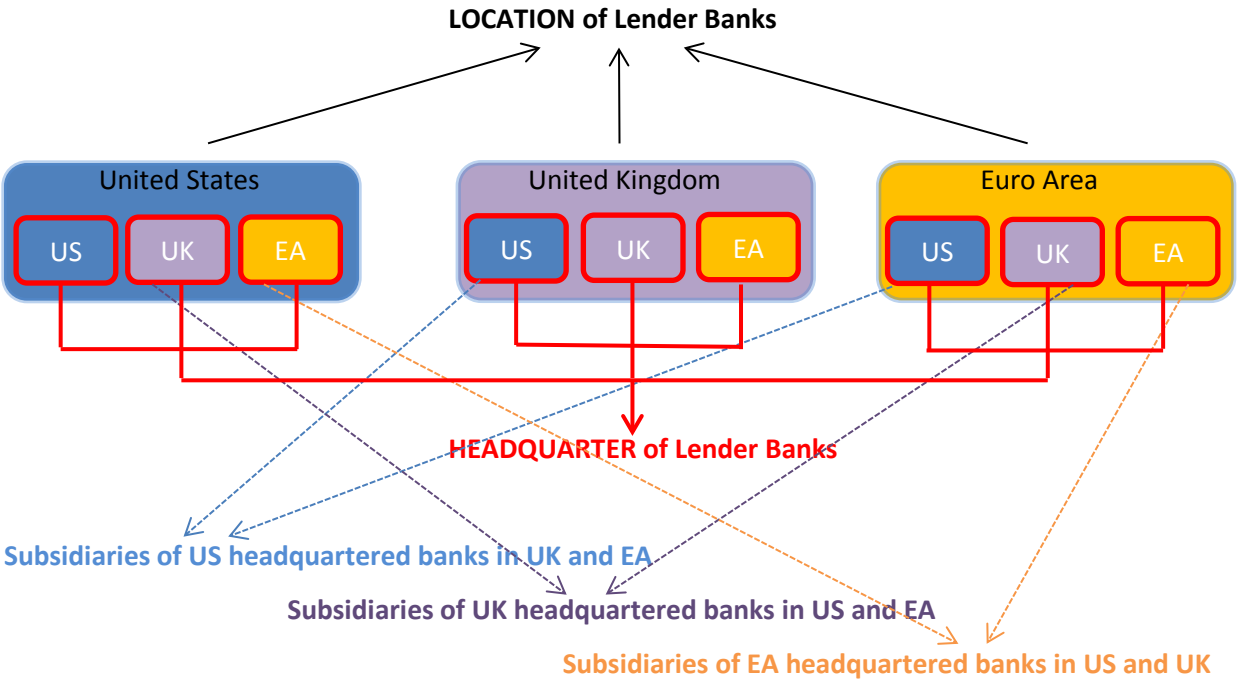


Figure 2: Regional Analysis of QE Policies
Summary of Estimates (Table 2 and Appendix Table 1a)

QE	Headquarter			Headquarter			Headquarter		
Fed	All Banks US HQ			All Banks EA HQ			All Banks UK HQ		
ECB	All Banks US HQ			All Banks EA HQ			All Banks UK HQ		
BoE	All Banks US HQ			All Banks EA HQ			All Banks UK HQ		
	US	EA	UK	US	EA	UK	US	EA	UK
Fed	US Loc	EA Loc	UK Loc	US Loc	EA Loc	UK Loc	US Loc	EA Loc	UK Loc
ECB	US Loc	EA Loc	UK Loc	US Loc	EA Loc	UK Loc	US Loc	EA Loc	UK Loc
BoE	US Loc	EA loc	UK Loc	US Loc	EA loc	UK Loc	US Loc	EA Loc	UK Loc

The green color indicates that QE policy has at least 10% significant impact on cross-border bank credit granted to Turkish banks. "US HQ" for example represents the US headquartered banks while "US Loc" represents the US located banks.

Figure 3: Currency Analysis of QE Policies
Summary of Estimates (Appendix Table 1b)

Location	US Headquartered Banks			EA Headquartered Banks			UK Headquartered Banks		
Currency	$	€	£	$	€	£	$	€	£
Fed									
ECB									
BoE									

The green color indicates that QE policy has at least 10% significant impact on cross-border bank credit granted to Turkish banks

Figure 4: Regional Analysis of QE Policies (Full Perspective)

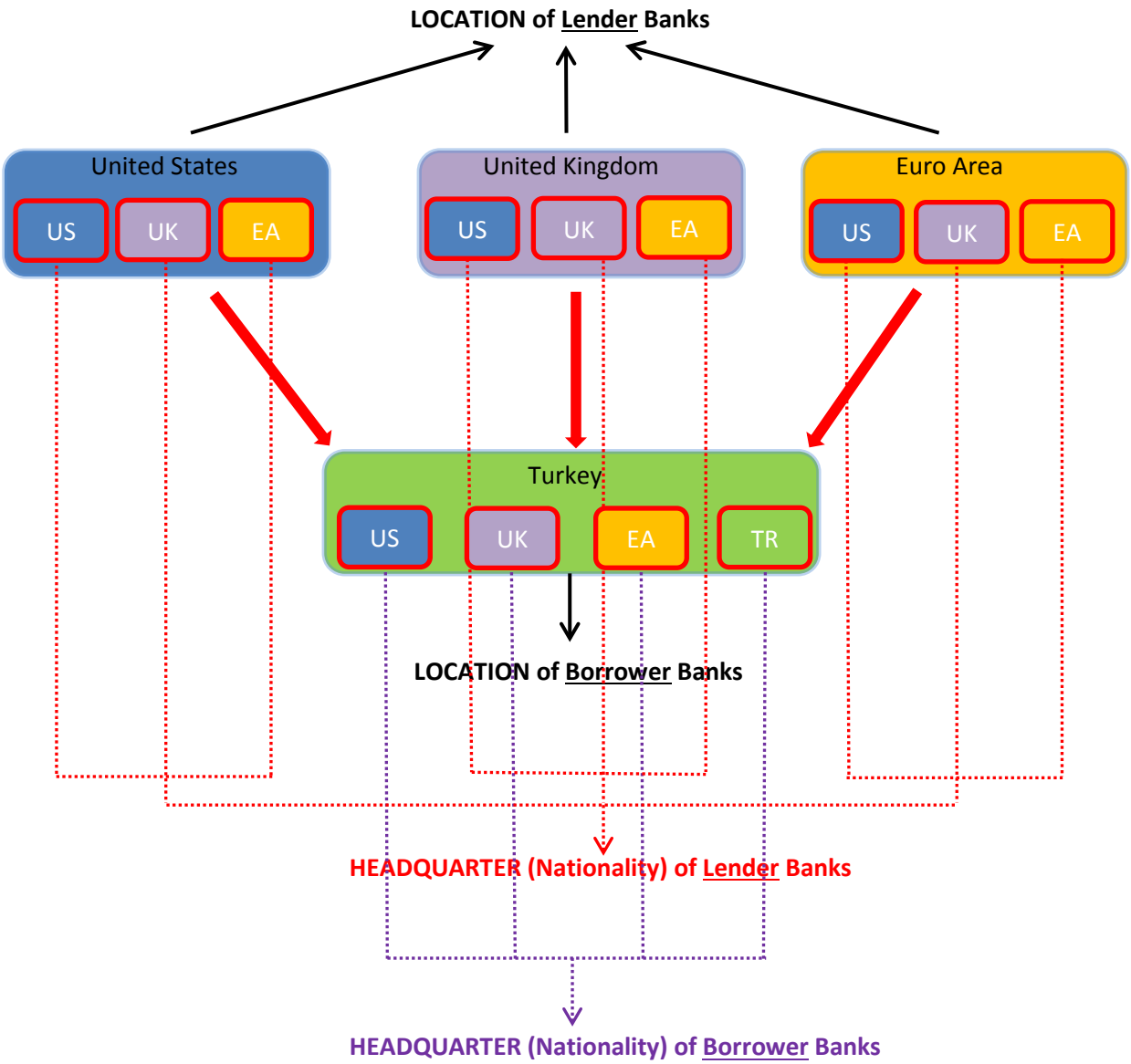


Figure 5: Affilated vs. Non-Affilated Loans
Summary of Appendix Table 1c

	HQ (Nationality) of Borrower Banks			
QE	US	EA	UK	TR
Fed				
ECB				
BoE				

The green color indicates that QE policy has at least 10% significant impact on cross-border bank credit granted to Turkish banks

Internet Appendix

Appendix Table 1a

The Impact of QE Policies on Turkish Banks' Cross-border Borrowing across Headquarters and Locations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Headquarter of Lender Banks	**US**	**US**	**US**	**EA**	**EA**	**EA**	**UK**	**UK**	**UK**
Location of Lender Banks	**US**	**EA**	**UK**	**US**	**EA**	**UK**	**US**	**EA**	**UK**
Σ Fed`s QE{t-1 to t-3}	0.032*	0.105***	0.085**	0.117***	0.018**	0.069**	0.059**	0.105***	0.033**
	[0.019]	[0.033]	[0.039]	[0.038]	[0.008]	[0.035]	[0.025]	[0.016]	[0.015]
Σ ECB`s QE{t-1 to t-3}	0.003	0.048***	0.044**	0.055*	0.017*	0.050*	-0.005	0.075*	0.029**
	[0.014]	[0.018]	[0.023]	[0.031]	[0.010]	[0.030]	[0.047]	[0.043]	[0.013]
Σ BoE`s QE{t-1 to t-3}	0.018	0.105	0.021	0.009	0.013	0.065*	0.103*	-0.052	0.034*
	[0.021]	[0.073]	[0.037]	[0.050]	[0.010]	[0.04]	[0.054]	[0.177]	[0.021]
Constant	-0.412	-0.976	32.029**	-6.083	-4.678*	8.410***	11.607*	0.092	21.301***
	[4.497]	[28.321]	[13.795]	[6.014]	[2.396]	[2.356]	[1.208]	[4.490]	[4.941]
Σ UK`s CAR{t-1 to t-3}	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender Country Fixed Effects	No	No	No	No	No	No	No	No	No
Lender Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Type Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Currency Type Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Maturity Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Global Liquidity Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender Country Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
TR Macro Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender Bank Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Bank Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.716	0.761	0.539	0.909	0.691	0.864	0.410	0.457	0.696
Number of Observations	9,780	635	3,537	428	24,945	1,778	571	585	9,225
Δ% in loans with Fed:	11.77	38.63	31.28	43.05	6.62	25.39	21.71	38.63	12.14
Δ% in loans with ECB:	1.18	18.88	17.31	21.64	6.69	19.67	-1.97	29.51	11.41
Δ% in loans with BoE:	7.21	42.06	8.41	3.61	5.21	26.04	41.26	-20.83	13.62

Note. -- The table reports estimates from ordinary least squares regressions. The dependent variable is the natural logarithm of Turkish banks' cross-border borrowing (from countries and lender banks with different loan types, maturities and currency types). Table 1 contains the definition of all variables and the summary statistics for each included variable. Global Liquidity Variables are the VIX, the monthly change in the US real policy rate, the 3-months US TED Spread and total M2 growth rate of four financial centers (US, EA, UK, Japan). Lender Country Variables are real GDP growth, inflation rate, monthly change in policy rate and monthly change in real effective exchange rate. Turkey (TR) Macro Variables are yearly change in industrial production index, inflation rate, monthly change in BIST o/n interest rate and monthly change in real effective exchange rate. Lender Bank Variables include the lagged values of Bank Total Assets, Capital Ratio, Liquidity Ratio, Credit Ratio, Deposit Ratio, ROA Ratio and NPL Ratio. Borrower Bank Variables include the lagged values of Bank Total Assets, Capital Ratio, Liquidity Ratio, Credit Ratio, Deposit Ratio, ROA Ratio and NPL Ratio. Analysis covers the period of 2008:M10 – 2014:M12. Coefficients are listed in the first row, robust standard errors are reported in the row below, and the corresponding significance levels are placed adjacently. Σ indicates sum of the three coefficients on the indicated lag terms (and corresponding standard errors and significance level). "Yes" indicates set of characteristics or fixed effects. "No" indicates set of characteristics or fixed effects is not included. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Appendix Table 1b

The Impact of QE Policies on Turkish Banks' Cross-border Borrowing across Headquarters and Currency Type

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Headquarter of Lender Banks	**US**	**US**	**US**	**EA**	**EA**	**EA**	**UK**	**UK**	**UK**
Currency	**USD**	**EUR**	**GBP**	**USD**	**EUR**	**GBP**	**USD**	**EUR**	**GBP**
Σ Fed`s QE{t-1 to t-3}	0.054***	0.067***	0.050*	0.029*	0.049**	0.096*	0.046*	0.048***	0.088**
	[0.013]	[0.015]	[0.027]	[0.017]	[0.019]	[0.055]	[0.028]	[0.017]	[0.033]
Σ ECB`s QE{t-1 to t-3}	0.021	0.027**	-0.005	0.027*	0.020*	0.059**	0.001	0.022*	0.068
	[0.014]	[0.012]	[0.132]	[0.016]	[0.012]	[0.023]	[0.017]	[0.013]	[0.066]
Σ BoE`s QE{t-1 to t-3}	0.017	-0.009	-0.121	-0.016	-0.007	0.088**	-0.003	0.045**	0.060
	[0.021]	[0.018]	[0.114]	[0.013]	[0.016]	[0.038]	[0.017]	[0.022]	[0.097]
Constant	8.538*	3.845***	-76.447	1.360	-4.797	4.365***	30.644***	8.436***	65.986*
	[4.576]	[1.340]	[77.722]	[4.081]	[4.152]	[1.136]	[6.896]	[0.397]	[34.931]
Σ UK`s CAR{t-1 to t-3}	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender Country Fixed Effects	No	No	No	No	No	No	No	No	No
Lender Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Type Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Currency Type Fixed Effects	No	No	No	No	No	No	No	No	No
Loan Maturity Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Global Liquidity Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender Country Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
TR Macro Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender Bank Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Bank Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.536	0.791	0.713	0.606	0.666	0.822	0.597	0.660	0.915
Number of Observations	9,354	4,342	172	7,514	11,600	340	5,634	4,468	274
Δ% in loans with Fed:	19.87	24.65	18.40	10.67	18.03	35.32	16.93	17.66	32.38
Δ% in loans with ECB:	8.26	10.62	-1.97	10.62	7.87	23.21	0.39	8.66	26.75
Δ% in loans with BoE:	6.81	-3.61	-48.47	-6.41	-2.80	35.25	-1.20	18.03	24.04

Note. -- The table reports estimates from ordinary least squares regressions. The dependent variable is the natural logarithm of Turkish banks' cross-border borrowing (from countries and lender banks with different loan types, maturities and currency types). Table 1 contains the definition of all variables and the summary statistics for each included variable. Global Liquidity Variables are the VIX, the monthly change in the US real policy rate, the 3-months US TED Spread and total M2 growth rate of four financial centers (US, EA, UK, Japan). Lender Country Variables are real GDP growth, inflation rate, monthly change in policy rate and monthly change in real effective exchange rate. Turkey (TR) Macro Variables are yearly change in industrial production index, inflation rate, monthly change in BIST o/n interest rate and monthly change in real effective exchange rate. Lender Bank Variables include the lagged values of Bank Total Assets, Capital Ratio, Liquidity Ratio, Credit Ratio, Deposit Ratio, ROA Ratio and NPL Ratio. Borrower Bank Variables include the lagged values of Bank Total Assets, Capital Ratio, Liquidity Ratio, Credit Ratio, Deposit Ratio, ROA Ratio and NPL Ratio. Analysis covers the period of 2008:M10 – 2014:M12. Coefficients are listed in the first row, robust standard errors are reported in the row below, and the corresponding significance levels are placed adjacently. Σ indicates sum of the three coefficients on the indicated lag terms (and corresponding standard errors and significance level). "Yes" indicates set of characteristics or fixed effects. "No" indicates set of characteristics or fixed effects is not included. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Appendix Table 1c

The Impact of QE Policies on Turkish Banks' Cross-border Borrowing by Nationality of Borrower Banks

	(1)	(2)
Σ Fed`s QE{t-1 to t-3} * BorrowerBank_US	0.026***	0.044***
	[0.007]	[0.012]
Σ Fed`s QE{t-1 to t-3} * BorrowerBank_EA	0.039***	0.048***
	[0.006]	[0.011]
Σ Fed`s QE{t-1 to t-3} * BorrowerBank_UK	0.039*	0.069**
	[0.023]	[0.032]
Σ Fed`s QE{t-1 to t-3} * BorrowerBank_TR	0.015***	0.037***
	[0.005]	[0.01]
Σ ECB`s QE{t-1 to t-3} * BorrowerBank_US	0.007***	-0.007
	[0.002]	[0.004]
Σ ECB`s QE{t-1 to t-3} * BorrowerBank_EA	0.006*	0.018***
	[0.003]	[0.005]
Σ ECB`s QE{t-1 to t-3} * BorrowerBank_UK	-0.014	0.035**
	[0.011]	[0.014]
Σ ECB`s QE{t-1 to t-3} * BorrowerBank_TR	0.006***	0.019***
	[0.002]	[0.004]
Σ BoE`s QE{t-1 to t-3} * BorrowerBank_US	0.011***	-0.001
	[0.002]	[0.005]
Σ BoE`s QE{t-1 to t-3} * BorrowerBank_EA	0.007***	0.016***
	[0.002]	[0.005]
Σ BoE`s QE{t-1 to t-3} * BorrowerBank_UK	0.018**	0.025**
	[0.008]	[0.011]
Σ BoE`s QE{t-1 to t-3} * BorrowerBank_TR	0.007***	0.017***
	[0.002]	[0.004]
Constant	7.160***	3.473**
	[0.175]	[1.714]
Σ UK`s CAR{t-1 to t-3}	Yes	Yes
Lender Country Fixed Effects	Yes	Yes
Lender Bank Fixed Effects	Yes	Yes
Borrower Bank Fixed Effects	Yes	Yes
Loan Type Fixed Effects	Yes	Yes
Currency Type Fixed Effects	Yes	Yes
Loan Maturity Fixed Effects	Yes	Yes
Global Liquidity Variables	No	Yes
Lender Country Variables	No	Yes
TR Macro Variables	No	Yes
Lender Bank Variables	No	Yes
Borrower Bank Variables	No	Yes
R2	0.659	0.629
Number of Observations	198,873	83,494
Δ% in loans with Fed:	9.57	16.19
	14.35	17.66
	14.35	25.39
	5.52	13.61
Δ% in loans with ECB:	2.75	-2.75
	2.36	7.08
	-5.51	13.77
	2.36	7.48
Δ% in loans with BoE:	4.41	-0.40
	2.80	6.41
	7.21	10.02
	2.80	6.81

Note. -- The table reports estimates from ordinary least squares regressions. The dependent variable is the natural logarithm of Turkish banks' cross-border borrowing (from countries and lender banks with different loan types, maturities and currency types). BorrowerBank_US, BorrowerBank_EA and BorrowerBank_UK are the dummy variables, and take the value 1 for Turkish banks which are the affiliates or subsidiaries of US, EA and UK headquartered global banks. Similarly, BorrowerBank_TR is a dummy variable, and takes the value 1 for domestically owned Turkish banks. Table 1 contains the definition of all variables and the summary statistics for each included variable. Global Liquidity Variables are the VIX, the monthly change in the US real policy rate, the 3-months US TED Spread and total M2 growth rate of four financial centers (US, EA, UK, Japan). Lender Country Variables are real GDP growth, inflation rate, monthly change in policy rate and monthly change in real effective exchange rate. Turkey (TR) Macro Variables are yearly change in industrial production index, inflation rate, monthly change in BIST o/n interest rate and monthly change in real effective exchange rate. Lender Bank Variables include the lagged values of Bank Total Assets, Capital Ratio, Liquidity Ratio, Credit Ratio, Deposit Ratio, ROA Ratio and NPL Ratio. Borrower Bank Variables include the lagged values of Bank Total Assets, Capital Ratio, Liquidity Ratio, Credit Ratio, Deposit Ratio, ROA Ratio and NPL Ratio. Analysis covers the period of 2008:M10 – 2014:M12. Coefficients are listed in the first row, robust standard errors are reported in the row below, and the corresponding significance levels are placed adjacently. Σ indicates sum of the three coefficients on the indicated lag terms (and corresponding standard errors and significance level). "Yes" indicates set of characteristics or fixed effects. "No" indicates set of characteristics or fixed effects is not included. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Robustness Table 1a

The Effects of QE Policies on Turkish Banks' Cross-border Borrowing across Headquarters, Locations, Currency Types and Maturities

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Headquarter of Lender Banks	All	All	**US**	**EA**	**UK**	All	All	All	All	All	All	All	All
Location of Lender Banks	All	All	All	All	All	**US**	**EA**	**UK**	All	All	All	All	All
Currency	All	All	All	All	All	All	All	All	**USD**	**EUR**	**GBP**	All	All
Included Maturities	All	All	All	All	All	All	All	All	All	All	All	**≤ 1 Year**	**> 1 Year**
Σ **Δ** Fed`s QE{t-1 to t-3}	0.016***	0.033***	0.026**	0.042***	0.036***	0.021**	0.048**	0.043***	0.028**	0.026***	0.048**	0.052***	0.029*
	[0.004]	[0.010]	[0.014]	[0.010]	[0.014]	[0.011]	[0.024]	[0.015]	[0.013]	[0.010]	[0.021]	[0.008]	[0.016]
Σ **Δ** ECB`s QE{t-1 to t-3}	0.014***	0.029***	-0.026	0.023***	0.014*	0.017***	0.026*	0.016*	0.011***	0.026***	0.027	0.030***	-0.013
	[0.002]	[0.008]	[0.022]	[0.006]	[0.009]	[0.006]	[0.015]	[0.010]	[0.003]	[0.007]	[0.057]	[0.006]	[0.013]
Σ **Δ** BoE`s QE{t-1 to t-3}	0.016***	0.026***	0.006	-0.004	0.017*	0.021	-0.005	0.000	0.000	0.015*	0.060**	0.015***	0.005
	[0.004]	[0.010]	[0.026]	[0.005]	[0.010]	[0.027]	[0.014]	[0.021]	[0.005]	[0.008]	[0.029]	[0.006]	[0.016]
Constant	0.068	2.814	2.041	1.537	1.421	0.137	2.375	6.119	7.647**	5.655	26.856	4.172	-0.430
	[0.054]	[1.925]	[9.213]	[2.582]	[7.161]	[9.700]	[3.173]	[5.544]	[3.319]	[4.632]	[23.508]	[2.764]	[2.944]
Σ UK`s CAR{t-1 to t-3}	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender Country Fixed Effects	Yes	Yes	No	Yes	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Lender Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Type Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Currency Type Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes
Loan Maturity Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Global Liquidity Variables	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender Country Variables	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
TR Macro Variables	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender Bank Variables	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Bank Variables	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.037	0.031	0.058	0.043	0.057	0.070	0.047	0.073	0.066	0.092	0.330	0.049	0.049
Number of Observations	96,800	39,493	7,365	14,788	5,386	5,096	13,004	6,741	13,882	8,644	738	21,125	18,368

Note. -- The table reports estimates from ordinary least squares regressions. The dependent variable is the yearly change in the natural logarithm of Turkish banks' cross-border borrowing (from countries and lender banks with different loan types, maturities and currency types). Table 1 contains the definition of all variables and the summary statistics for each included variable. Global Liquidity Variables are the VIX, the monthly change in the US real policy rate, the 3-months US TED Spread and total M2 growth rate of four financial centers (US, EA, UK, Japan). Lender Country Variables are real GDP growth, inflation rate, monthly change in policy rate and monthly change in real effective exchange rate. Turkey (TR) Macro Variables are yearly change in industrial production index, inflation rate, monthly change in BIST o/n interest rate and monthly change in real effective exchange rate. Lender Bank Variables include the lagged values of Bank Total Assets, Capital Ratio, Liquidity Ratio, Credit Ratio, Deposit Ratio, ROA Ratio and NPL Ratio. Borrower Bank Variables include the lagged values of Bank Total Assets, Capital Ratio, Liquidity Ratio, Credit Ratio, Deposit Ratio, ROA Ratio and NPL Ratio. Analysis covers the period of 2008:M10 – 2014:M12. Coefficients are listed in the first row, robust standard errors are reported in the row below, and the corresponding significance levels are placed adjacently. Σ indicates sum of the three coefficients on the indicated lag terms (and corresponding standard errors and significance level). "Yes" indicates set of characteristics or fixed effects. "No" indicates set of characteristics or fixed effects is not included. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Robustness Table 1b

The Global Lending Channel: The Impact of QE Policies on Turkish Banks' Cross-border Borrowing with Varying Capital or Liquidity Ratios of Lender Banks

	(1)	(2)	(3)	(4)
Lender Bank Ratio	**Capital Ratio**		**Liquidity Ratio**	
Σ (Δ Fed`s QE * Lender Bank Ratio) {t-1 to t-3}	-0.529***	-0.453*	-0.041*	-0.090*
	[0.103]	[0.254]	[0.024]	[0.051]
Σ (Δ ECB`s QE * Lender Bank Ratio) {t-1 to t-3}	-0.116**	-0.333**	0.014	-0.056
	[0.052]	[0.135]	[0.017]	[0.043]
Σ (Δ BoE`s QE * Lender Bank Ratio) {t-1 to t-3}	-0.310***	-0.551***	0.005	-0.076*
	[0.084]	[0.184]	[0.026]	[0.047]
Σ Lender Bank Ratio {t-1 to t-3}	2.231***	2.213*	0.340**	-0.067
	[0.588]	[1.244]	[0.133]	[0.649]
Lender Country Fixed Effects	Yes	Yes	Yes	Yes
Lender Bank Fixed Effects	Yes	Yes	Yes	Yes
Borrower Bank Fixed Effects	-	-	-	-
(Borrower Bank*Month) Fixed Effects	Yes	Yes	Yes	Yes
Loan Type Fixed Effects	Yes	Yes	Yes	Yes
Currency Type Fixed Effects	Yes	Yes	Yes	Yes
Loan Maturity Fixed Effects	Yes	Yes	Yes	Yes
Global Liquidity Variables	-	-	-	-
Lender Country Variables	No	Yes	No	Yes
TR Macro Variables	-	-	-	-
Lender Bank Variables	No	Yes	No	Yes
Borrower Bank Variables	-	-	-	-
Global Liquidity Variables*Lender Bank Ratio	No	Yes	No	Yes
Lender Country Variables*Lender Bank Ratio	No	Yes	No	Yes
TR Macro Variables*Lender Bank Ratio	No	Yes	No	Yes
R2	0.071	0.077	0.075	0.081
Number of Observations	59,778	35,114	52,526	34,918

Note. -- The table reports estimates from ordinary least squares regressions. The dependent variable is the yearly change in the natural logarithm of Turkish banks' cross-border borrowing (from countries and lender banks with different loan types, maturities and currency types) for lender banks with different capital ratios. Table 1 contains the definition of all variables and the summary statistics for each included variable. Global Liquidity Variables are the VIX, the monthly change in the US real policy rate, the 3-months US TED Spread and total M2 growth rate of four financial centers (US, EA, UK, Japan). Lender Country Variables are real GDP growth, inflation rate, monthly change in policy rate and monthly change in real effective exchange rate. Turkey (TR) Macro Variables are yearly change in industrial production index, inflation rate, monthly change in BIST o/n interest rate and monthly change in real effective exchange rate. Lender Bank Variables include the lagged values of Bank Total Assets, Capital Ratio, Liquidity Ratio, Credit Ratio, Deposit Ratio, ROA Ratio and NPL Ratio. Borrower Bank Variables include the lagged values of Bank Total Assets, Capital Ratio, Liquidity Ratio, Credit Ratio, Deposit Ratio, ROA Ratio and NPL Ratio. Analysis covers the period of 2008:M10 – 2014:M12. Coefficients are listed in the first row, robust standard errors are reported in the row below, and the corresponding significance levels are placed adjacently. Σ indicates sum of the three coefficients on the indicated lag terms (and corresponding standard errors and significance level). "Yes" indicates set of characteristics or fixed effects. "No" indicates set of characteristics or fixed effects is not included. "-" indicates that the indicated set of characteristics or fixed effects are comprised in the wider included set of fixed effects. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Robustness Table 1c

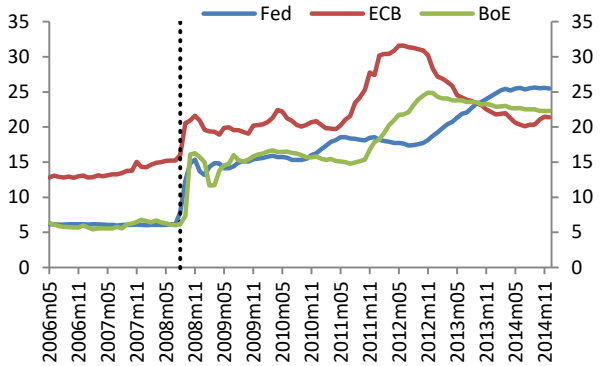
The Global Borrowing Channel: The Impact of QE Policies on Turkish banks' Cross-border Borrowing with Varying Capital or Liquidity Ratios of Borrower Banks

	(1)	(2)	(3)	(4)
Borrower Bank Ratio	**Capital Ratio**		**Liquidity Ratio**	
Σ (**Δ** Fed`s QE * Borrower Bank Ratio) {t-1 to t-3}	-0.264**	-0.687*	-0.232**	-0.161**
	[0.117]	[0.414]	[0.108]	[0.067]
Σ (**Δ** ECB`s QE * Borrower Bank Ratio) {t-1 to t-3}	-0.123*	-0.606**	-0.155***	-0.139***
	[0.069]	[0.255]	[0.041]	[0.051]
Σ (**Δ** BoE`s QE * Borrower Bank Ratio) {t-1 to t-3}	-0.201*	0.366	-0.036	-0.200***
	[0.107]	[0.279]	[0.054]	[0.066]
Σ Borrower Bank Ratio {t-1 to t-3}	-0.125	8.165**	0.614**	1.471*
	[0.571]	[3.619]	[0.283]	[0.821]
Lender Country Fixed Effects	Yes	Yes	Yes	Yes
Lender Bank Fixed Effects	-	-	-	-
(Lender Bank*Month) Fixed Effects	Yes	Yes	Yes	Yes
Borrower Bank Fixed Effects	Yes	Yes	Yes	Yes
Loan Type Fixed Effects	Yes	Yes	Yes	Yes
Currency Type Fixed Effects	Yes	Yes	Yes	Yes
Loan Maturity Fixed Effects	Yes	Yes	Yes	Yes
Global Liquidity Variables	-	-	-	-
Lender Country Variables	No	Yes	No	Yes
TR Macro Variables	-	-	-	-
Lender Bank Variables	-	-	-	-
Borrower Bank Variables	No	Yes	No	Yes
Global Liquidity Variables*Borrower Bank Ratio	No	Yes	No	Yes
Lender Country Variables*Borrower Bank Ratio	No	Yes	No	Yes
TR Macro Variables*Borrower Bank Ratio	No	Yes	No	Yes
R2	0.214	0.190	0.214	0.191
Number of Observations	81,209	46,897	81,209	46,897

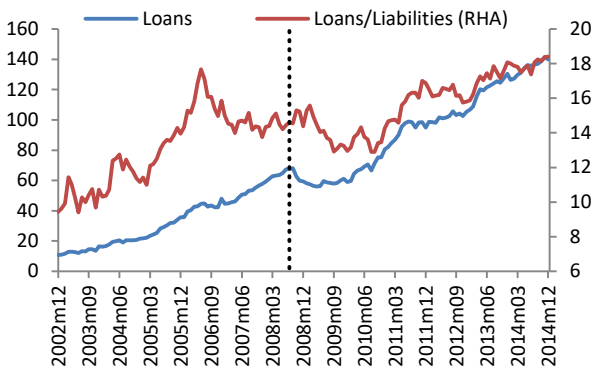
Note. -- The table reports estimates from ordinary least squares regressions. The dependent variable is the yearly change in the natural logarithm of Turkish banks' cross-border borrowing (from countries and lender banks with different loan types, maturities and currency types) for borrower banks with different capital ratios. Table 1 contains the definition of all variables and the summary statistics for each included variable. Global Liquidity Variables are the VIX, the monthly change in the US real policy rate, the 3-months US TED Spread and total M2 growth rate of four financial centers (US, EA, UK, Japan). Lender Country Variables are real GDP growth, inflation rate, monthly change in policy rate and monthly change in real effective exchange rate. Turkey (TR) Macro Variables are yearly change in industrial production index, inflation rate, monthly change in BIST o/n interest rate and monthly change in real effective exchange rate. Lender Bank Variables include the lagged values of Bank Total Assets, Capital Ratio, Liquidity Ratio, Credit Ratio, Deposit Ratio, ROA Ratio and NPL Ratio. Borrower Bank Variables include the lagged values of Bank Total Assets, Capital Ratio, Liquidity Ratio, Credit Ratio, Deposit Ratio, ROA Ratio and NPL Ratio. Analysis covers the period of 2008:M10 – 2014:M12. Coefficients are listed in the first row, robust standard errors are reported in the row below, and the corresponding significance levels are placed adjacently. Σ indicates sum of the three coefficients on the indicated lag terms (and corresponding standard errors and significance level). "Yes" indicates set of characteristics or fixed effects. "No" indicates set of characteristics or fixed effects is not included. "-" indicates that the indicated set of characteristics or fixed effects are comprised in the wider included set of fixed effects. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Appendix-II: Time Series Charts of Cross-Border Borrowing by Banks in Turkey

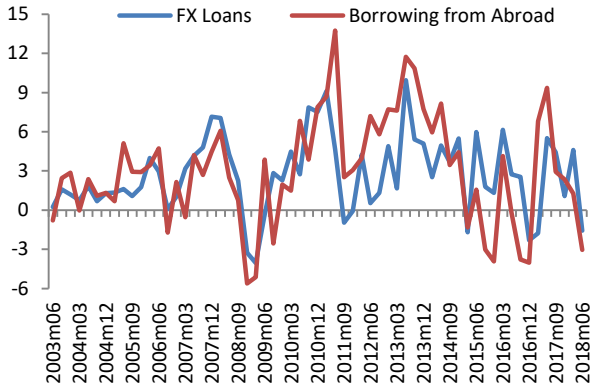
Graph 1: Total Central Bank Assets (% of GDP)



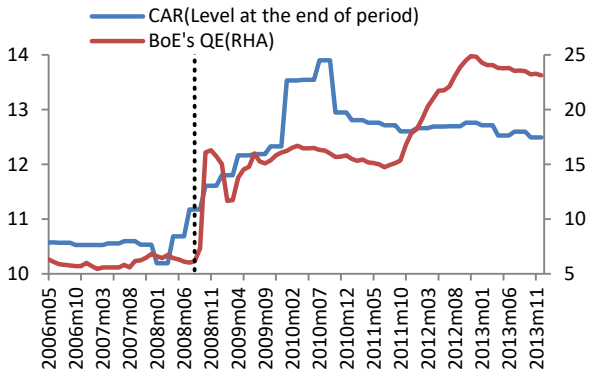
Graph 2: Amount of Turkish Banks' Cross-Border Loans and Ratio to Total Liabilities (Billion USD, %)



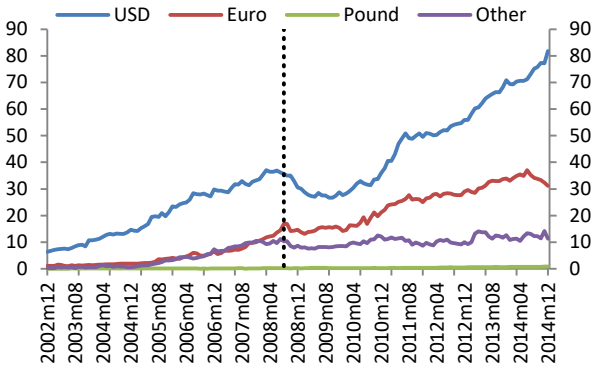
Graph 3: Quarterly Change in FX Loans and Banks' Borrowing from Abroad (Billion USD)



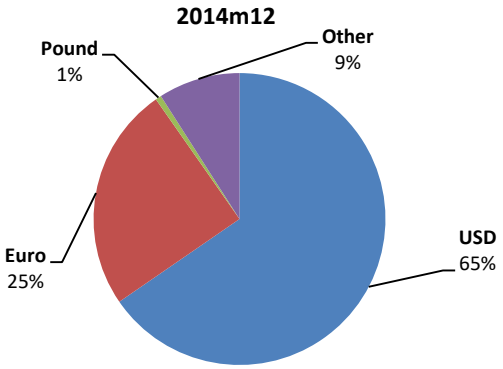
Graph 4: UK Capital Requirements and QE (%)



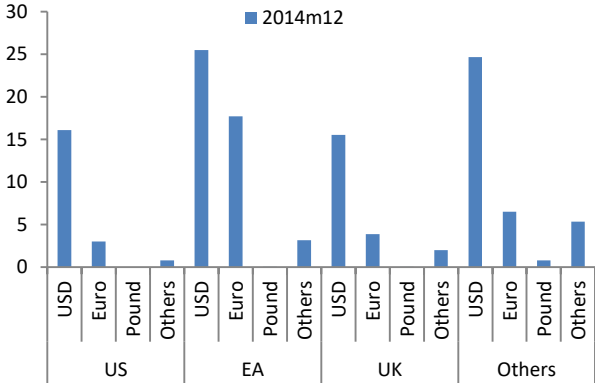
Graph 5a: Currency Breakdowns of Cross-Border Loans (Billion USD)



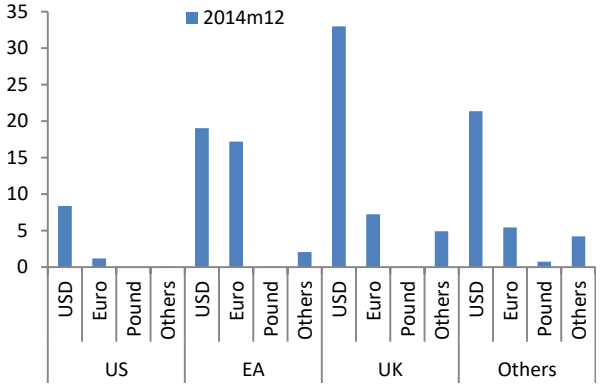
Graph 5b: Currency Breakdowns of Cross-Border Loans (%)



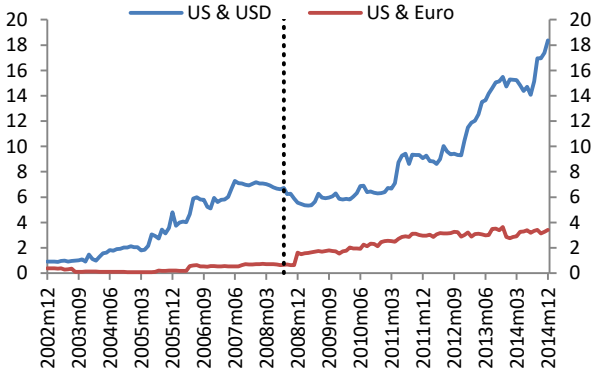
Graph 6a: Currency Breakdowns of Cross-Border Loans (Based on Headquarters of Lender Banks, Billion USD)



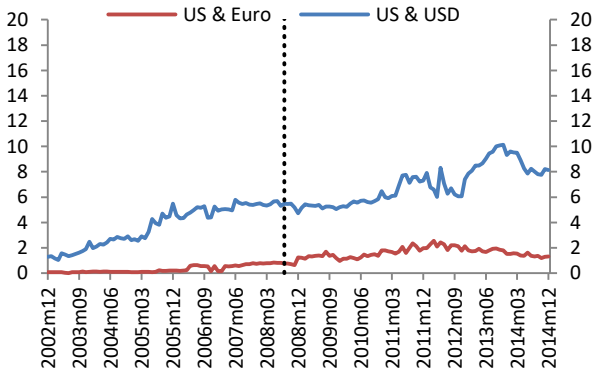
Graph 6b: Currency Breakdowns of Cross-Border Loans (Based on Location of Lender Banks, Billion USD)



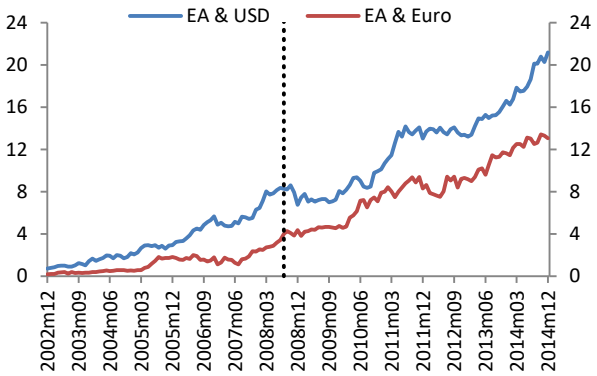
Graph 7a: Currency Breakdowns of US Banks' Cross-Border Loans (Based on Headquarters of Lender Banks, Billion USD)



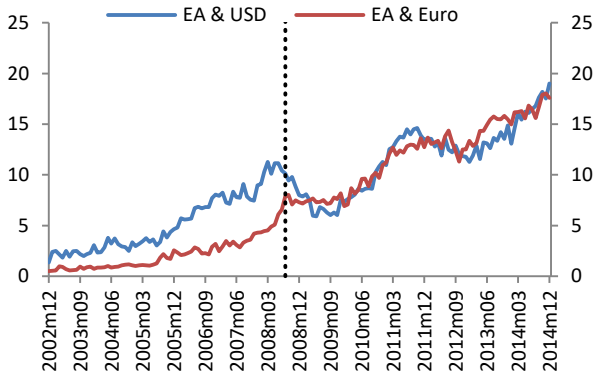
Graph 7b: Currency Breakdowns of US Banks' Cross-Border Loans (Based on Location of Lender Banks, Billion USD)



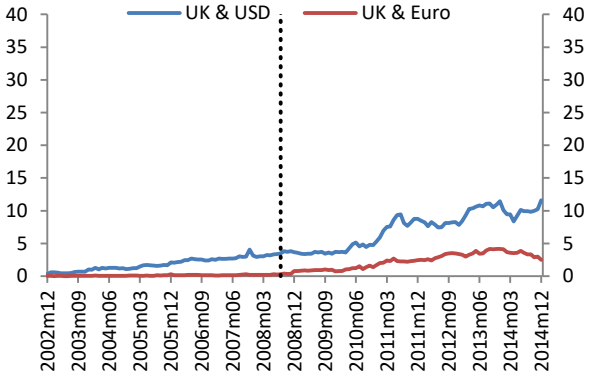
Graph 8a: Currency Breakdowns of EA Banks' Cross-Border Loans (Based on Headquarters of Lender Banks, Billion USD)



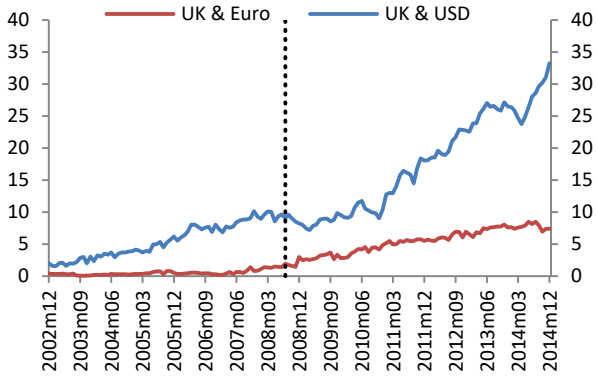
Graph 8b: Currency Breakdowns of EA Banks' Cross-Border Loans (Based on Location of Lender Banks, Billion USD)



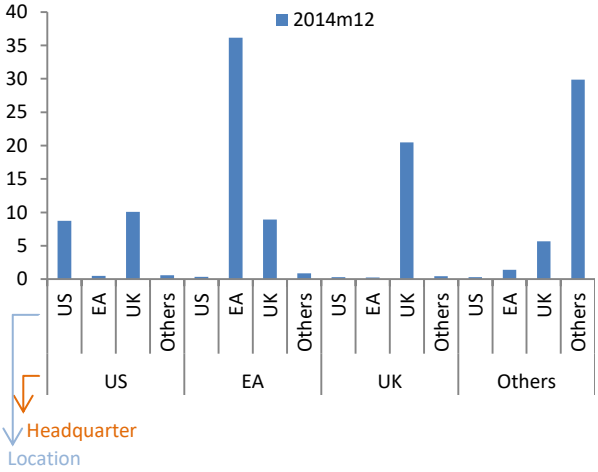
Graph 9a: Currency Breakdowns of UK Banks' Cross-Border Loans (Based on Headquarters of Lender Banks, Billion USD)



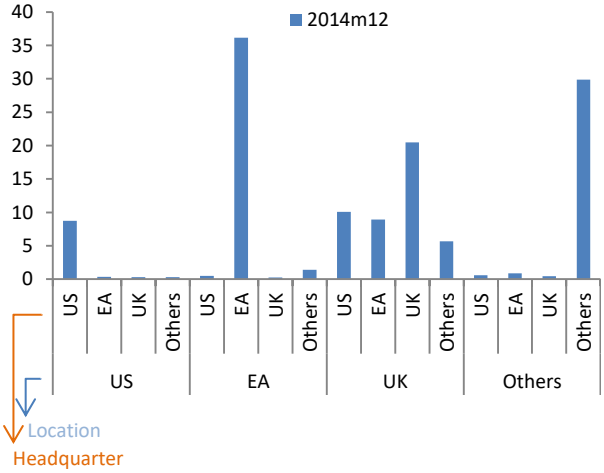
Graph 9b: Currency Breakdowns of UK Banks' Cross-Border Loans (Based on Location of Lender Banks, Billion USD)



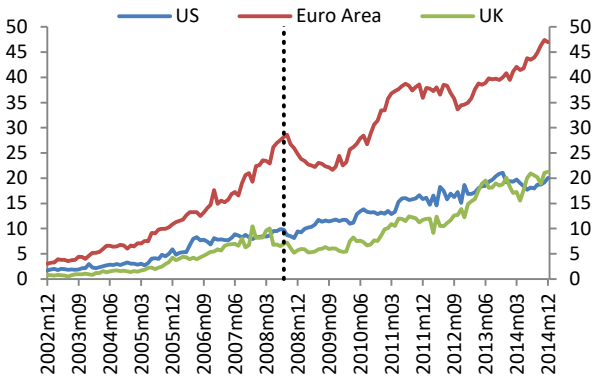
Graph 10a: Regional Distribution of Cross-Border Loans (Based on Headquarters of Lender Banks, Billion USD)



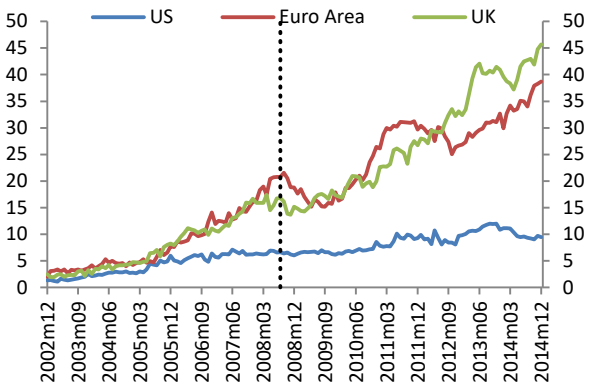
Graph 10b: Regional Distribution of Cross-Border Loans (Based on Location of Lender Banks, Billion USD)



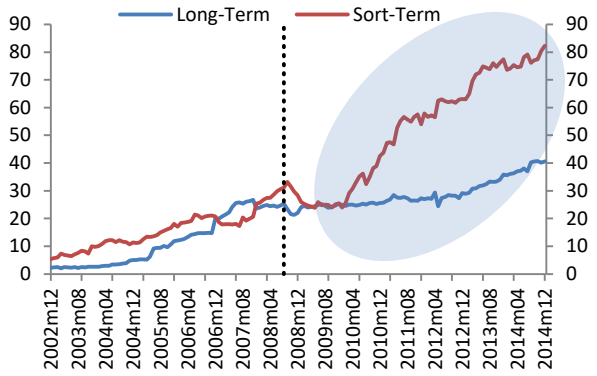
Graph 11a: Regional Distribution of Cross-Border Loans (Based on Headquarters of Lender Banks, Billion USD)



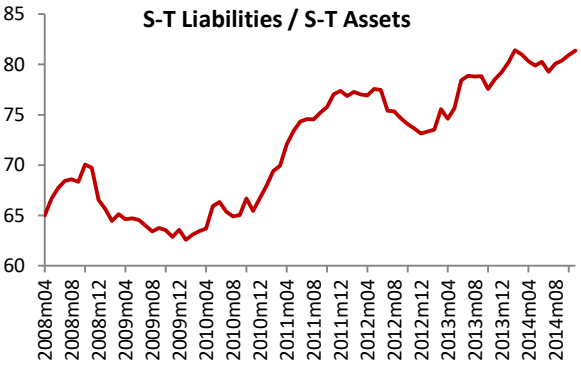
Graph 11b: Regional Distribution of Cross-Border Loans (Based on Location of Lender Banks, Billion USD)



Graph 12a: Maturity Breakdowns of Cross-Border Loans (Billion USD)



Graph 12b: S-T Liabilities / S-T Assets (%)



Swiss Finance Institute

Swiss Finance Institute (SFI) is the national center for fundamental research, doctoral training, knowledge exchange, and continuing education in the fields of banking and finance. SFI's mission is to grow knowledge capital for the Swiss financial marketplace. Created in 2006 as a public–private partnership, SFI is a common initiative of the Swiss finance industry, leading Swiss universities, and the Swiss Confederation.

swiss:finance:institute

c/o University of Geneva, Bd. Du Pont d'Arve 42, CH-1211 Geneva 4
T +41 22 379 84 71, rps@sfi.ch, www.sfi.ch